Vol. 37, No. 1

THE

MICHIGAN BOTANIST

January, 1998

THE MICHIGAN BOTANIST (ISSN 0026–203X) is published four times per year (January, March, May, and October) by the Michigan Botanical Club, c/o Herbarium, North University Building, The University of Michigan, Ann Arbor, MI 48109–1057. Second-class postage paid at Ann Arbor, MI. POSTMASTER: Send address changes to *THE MICHIGAN BOTANIST*, c/o Herbarium, North University Building, The University of Michigan, Ann Arbor, MI 48109–1057.

Subscriptions: See below. Single copies: $4.00.

Back issues are available except as noted below. Prices are: Vols. 1–13, $3.00 per vol. ($0.75 per no.); Vols. 14–18, $5.00 per vol. ($1.25 per no.); Vols. 19–21, $8.00 per vol. ($2.00 per no.); Vols. 22–31, $10.00 per vol. ($2.50 per no.); 32–present, $16.00 per vol. ($4.00 per no.).

The following issues are available only in complete sets or in sets beginning with Vol. 2 (marked as *): 1(1, 2 – all published), 2(1*, 4*), 4(3*), 5(1*, 2*, 3*), 7(4*), 9(3*), 19(3), and 26(3).

Institutional subscriptions and all orders for back issues should be addressed to the Business and Circulation Manager.

Address changes should be sent to the Business and Circulation Manager.

Articles dealing with any phase of botany relating to the Great Lakes Region may be sent to the Editor. In preparing manuscripts, authors are requested to follow our style and the suggestions in "Information for Authors" (Vol. 28, p. 43; Vol. 29, p. 143).

THE MICHIGAN BOTANICAL CLUB

Membership in the Michigan Botanical Club is open to anyone interested in its aims: conservation of all native plants; education of the public to appreciate and preserve plant life; sponsorship of research and publication on the plant life of the State; sponsorship of legislation to promote the preservation of Michigan native flora; establishment of suitable sanctuaries and natural areas; and cooperation in programs concerned with the wise use and conservation of all natural resources and scenic features.

Dues are modest, but vary slightly among the chapters and with different classes of membership. Persons desiring to become state members (not affiliated with a local chapter, for which contact persons are listed below), may send $17.00 dues to the Membership Chairperson listed below. In all cases, dues include a subscription to *THE MICHIGAN BOTANIST*. (Institutions desiring to subscribe should deal directly with the Business and Circulation Manager.) Foreign subscribers should remit in U.S. funds.

President: Elwood B. Ehrle, Biological Sciences Dept., Western Michigan University, Kalamazoo, MI 49008
Treasurer: David A. Steen, Biology Department, Andrews University, Berrien Springs, MI 49103
Membership Chairperson: Alta Lahner, 6088 Old Log Trail, Kalamazoo, MI 49009
Huron Valley Chapter: Irene Eiseman, 1873 Pierce Road, Chelsea, MI 48118
Red Cedar Chapter: Hal Juran, P.O. Box 1395, East Lansing, MI 49104-0410
Southeastern Chapter: Margaret Converse, 34084 Dorais, Livonia, MI 48154
Southwestern Chapter: Sharon Heaney, 409 S. Cass, Berrien Springs, MI 49103
White Pine Chapter: Dorothy A. Sibley, 7951 Walnut, Newaygo, MI 49337

THE DISTRIBUTION OF CAREX PLATYPHYLLA (CYPERACEAE: SECT. CAREYANAE) WITH EMPHASIS ON THE WESTERN GREAT LAKES REGION

Theodore S. Cochrane
Herbarium, Department of Botany
University of Wisconsin-Madison
Madison, WI 53706-1381

Broad-leaved wood sedge, *Carex platyphylla* Carey, is a rather attractive, conspicuous species of dry, mesic, or moist deciduous woods and shady ravines, slopes, and banks of the eastern United States and adjacent Canada. Although generally frequent to common throughout much of the eastern part of its range, the species is extremely local in the western Great Lakes region.

DESCRIPTION

Carex platyphylla most closely resembles *C. albursina* Sheldon but should not be mistaken for this or any other member of sect. *Careyanae* or sect. *Laxiflorae.* Both are broad-leaved like *C. plantaginea* Lam. and *C. careyana* Torr. but differ in the absence of "Bordeaux red" color at the plant-base and bract-sheaths. All four have the blades of the basal leaves slightly cross-puckered (flattened in drying). *Carex platyphylla* differs from all species of both groups in its strikingly glaucous appearance, usually numerous weak culms, and, except sometimes for *C. albursina,* which is occasionally somewhat glaucous, by its short stature. Its basal leaves are evergreen and, like the cauline leaves and bracts (including the edges of the bract-sheaths), perfectly glabrous (except for the minutely roughened margins). The species can further be distinguished from *C. albursina* and from the variable *C. laxiflora* Lam., common in Wisconsin's eastern counties, by its smaller, narrower bracts; short, rough peduncles; and sharply triangular perigynia, which are often somewhat shorter but tapering instead of abruptly narrowed at the apex.

DISTRIBUTION

The distribution of *Carex platyphylla* is paralleled to a large degree by those of closely related, sympatric species of the *C. laxiflora* group (see Ball 1990) except that it is characterized by a range disjunction. Its main or eastern range extends throughout the ridges, valleys, and plateaus of the Appalachian System, where it may be "Frequent" (Clarkson 1966, Seymour 1982, Shreve et al. 1910) or "Common" (Andreas 1989, Brown & Brown 1984, Strausbaugh & Core

1952). It reaches its southern terminus in northern Georgia[1] and its northern limits in the St. Lawrence Lowlands of southern Ontario and extreme southern Quebec (Fig. 1). Northeastward, its range narrows and soon ends upon entering the wide plain of the Atlantic formation. Its range barely encroaches upon the Interior Low Plateaus and Central Lowlands provinces except for the "Carolinian" (deciduous forest) region and the Georgian Bay district in southern Ontario, the "Knobs" (hilly unglaciated) section of southern Indiana, and the shore of Lake Michigan in Michigan and Wisconsin. This sedge occurs north of Lake Ontario and in the Ottawa Valley in Ontario, but it abruptly becomes extremely local throughout the area west of a line joining Giant's Tomb Island and Cedar Point on Georgian Bay, Hamilton on Lake Ontario, and Sandusky on Lake Erie, barely advancing into the western end of the Carolinian Zone. Its main range ends not much farther west just across the St. Clair River in easternmost Michigan. However, at some distance to the west *C. platyphylla* reappears as small, widely scattered populations restricted to the immediate vicinity of Lake Michigan (Fig. 1). This group of populations constitutes a distinct secondary or western range that is separate from the more or less continuous eastern range. Apparently Lake Michigan provides climatic influences that are important in satisfying the habitat requirements of these geographically peripheral populations.

STATUS AND HABITATS IN THE WESTERN GREAT LAKES REGION

Records indicate that *Carex platyphylla* has always been rare in the western Great Lakes region even though the mesophytic woods in which it grows are seemingly unspecialized. It is officially listed as threatened in Michigan (Michigan Endangered Species Program & Michigan Natural Features Inventory 1992); but it is not included in lists of rare and endangered plants for Wisconsin (Read 1976, Wisconsin Department of Natural Resources 1993, Wisconsin Natural Heritage Program 1999) or, quite rightly, Illinois (Herkert 1991) and Missouri (Missouri Natural Heritage Database 1999) despite the fact that there are a few specific literature reports and/or historical records from these three states. Its restricted distribution and apparent rarity in Wisconsin are sufficient grounds for placing *C. platyphylla* on the state list of plants of special concern until the proper status category can be determined for it. However, the validity of the

[1]The geographical distribution of *Carex platyphylla* as given in the standard manuals (Fernald 1950, Gleason 1952, Gleason & Cronquist 1991, Radford et al. 1968, Small 1933) implies that it does not range south into Georgia. Neither Bryson (1980) nor Jones and Coile (1988) found a record of it from that state although it had been listed by Duncan and Kartesz (1981). The following recent collections vouch for its occurrence in northern Georgia: UNION CO.: large population (1000+ plants), rich hardwood forest *(Quercus rubra* (red oak)- *Liriodendron tulipifera* (tulip tree)), Chattahoochie NF, above and below FS Rd 100, 40 m E of unnamed gap just W of Ross Gap, elev. 854 m [as 2800 ft], 24 Jul 1995 *(Govus 687,* GA), 24 May 1996 *(Govus 751,* GA). WALKER CO.: base of rocky slope near mouth of Gayton Gulf, Pigeon Mountain, 15 km [as ca 9.4 mi] SW of Lafayette, 3 km [as ca 1.75 mi] NW of Harrisburg, 6 Apr 1991 *(Allison & Murphy 5130,* GA).

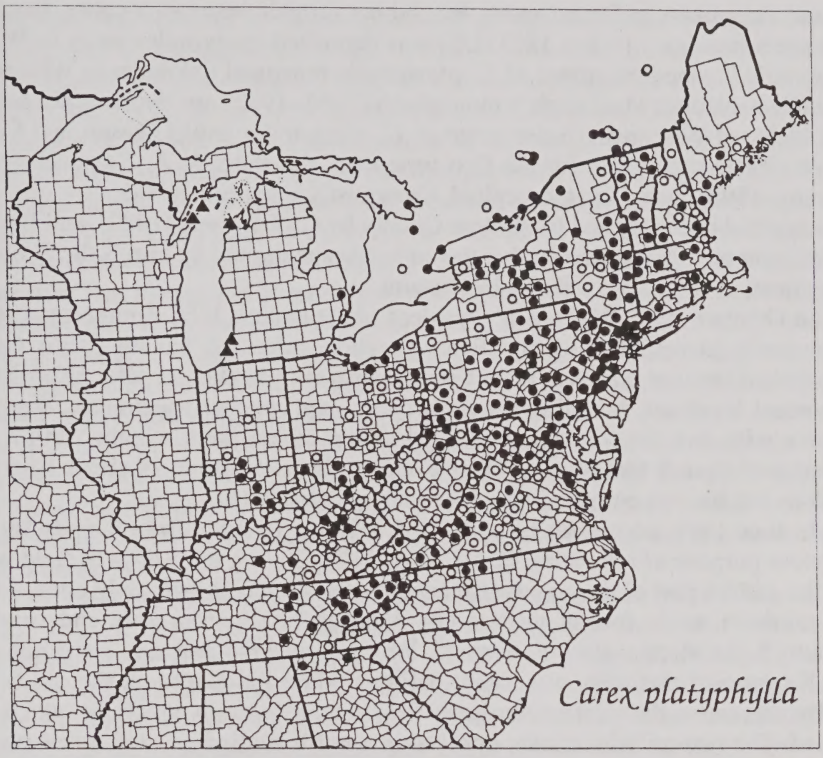

FIGURE 1. Distribution of *Carex platyphylla* based on herbarium specimens examined in PENN, PH, VDB, and WIS; photocopies of selected specimens received from GA, MICH, and MSC; and records cited by Bryson (1980). Open circles are reports from correspondence (Ford-Werntz in litt., 1998) and literature: Andreas (1989), Braun (1967), Campbell (1992), Chester et al. (1993), Deam (1940), Doyon and Lavoie (1966), New York Flora Association (1990), Montgomery (1945), Radford et al. (1968), Rhoads and Klein (1993), Harvill, Stevens, and Ware (1977), Seymour (1982), and Skelton and Skelton (1991). Triangles indicate exact locations in the western Great Lakes region.

record purporting to be from Illinois may be problematic, and the reports from Missouri are in error.

Wisconsin

The status of *Carex platyphylla* as a member of the Wisconsin flora is not generally recognized although its known history in the state actually goes back over 100 years. The importance of additional records of an unquestionably rare species and lack of documentation in the form of specimens in herbaria in Wisconsin make it useful to discuss the status and distribution of this species in the state.

The first record of *Carex platyphylla* in Wisconsin seems to be that of J. H. Schuette, one of the major collectors of the flora of northeastern Wisconsin. He

found the species in Door County but did not furnish the exact locality. Because his specimen *(s.n.,* 19 Jun 1883, US) was deposited many miles away in Washington, D.C., the occurrence of *C. platyphylla* remained unknown to Wisconsin botanists. Neither Mackenzie's monograph (1931–1935) nor the standard manuals included Wisconsin in the range of *C. platyphylla* until Gleason and Cronquist (1991) reported it for the first time from the state. A. A. Reznicek (pers. comm. 1995) stated that he called Cronquist's attention to the fact that this species had been mapped from Door County by C. T. Bryson (1980), and Bryson (pers. comm. 1995) affirmed that the collection examined by him is the Schuette specimen in the U. S. National Herbarium.

In October 1989, Wisconsin's resident sedge expert, J. H. Zimmerman (now deceased), in response to my direct question, admitted having found *Carex platyphylla* at four places in Door County. However, he did not offer information on exact localities, nor did he ever provide any voucher specimens. Zimmerman's wife and field companion, E. H. Zimmerman (pers. comm. 1998), has continued to seek this plant in Door County. She now knows of about 10 populations but has not collected or pressed any plants herself.

In June 1994, accompanied by B. A. Cochrane, I visited Door County for the express purpose of relocating *Carex platyphylla.* During three days of field work in the eastern part of the county, we encountered *C. platyphylla* only once. Areas of northern mesic forests surrounding Mud and Kangaroo lakes and fronting nearby Lake Michigan were searched. We examined the east side and south end of Kangaroo Lake without success before finding the *Carex* on the old beach ridge that forms the western border of the elongate basin in which the lake is situated. The two-mile-long lake, oriented in a north-south direction, forms part of an old embayment that was blocked off by sand dunes from Lake Michigan. The low bordering ridge, like much of the Door Peninsula, consists of well-drained, glacially derived, neutral to mildly calcareous soils (in this case Kiva sandy loam; cf. Link et al. 1978). The cool climate supports a cover of upland mesic forest, a habitat abundant on the Door Peninsula.

Carex platyphylla was locally frequent in the *Fagus grandifolia* Ehrh.-*Acer saccharum* Marshall (beech-sugar maple) forest along the west side of Kangaroo Lake Rd. at its intersection with Beach Rd. A colony of approximately 80 plants was scattered throughout a roughly triangular-shaped area 27 m long by 27 m wide on a gentle S-facing slope at an elevation of 192 m [630 ft]. Many of the plants occurred on the sides of low hummocks. Other trees in the woods were *Fraxinus americana* L. (white ash), *Betula papyrifera* Marshall (paper birch), and small *Ostrya virginiana* (Miller) K. Koch (hop-hornbeam). The groundlayer mixture of characteristic herbs did not at all indicate a unique ecological setting. It included *Adiantum pedatum* L. (maidenhair fern) (rare), *Trillium grandiflorum* (Michx.) Salisb. (large-flowered trillium), *Epipactis helleborine* (L.) Crantz (helleborine) (which is so well established as to appear an integral part of the Door Co. flora), *Caulophyllum thalictroides* (L.) Michx. (blue cohosh), *Actaea pachypoda* Ell. (doll's-eyes), *Thalictrum dioicum* L. (early meadow-rue), *Viola pubescens* Aiton var. *scabriuscula* Schwein. ex Torr. & A. Gray (yellow violet), and *Solidago flexicaulis* L. (zigzag goldenrod) as well as several species of *Carex: C. communis* Bailey (common); *C. arctata* W. Boott, *C. rosea* Schk., *C.*

deweyana Schwein., *C. laxiflora* Lam., and *C. hitchcockiana* Dewey (all occasional); and *C. sparganioides* Muhl. (rare). A collection of individual fruiting plants *(Cochrane & Cochrane 13280-a)* was made on June 22 and distributed to MICH, MIL, NY, ctb (personal herbarium of C.T. Bryson), UWGB, and WIS.

Across Beach Rd. was a subpopulation of this sedge (represented by *13280-b,* WIS) approximately 37 m from the first population and growing in basically the same habitat. The plants, however, were not dispersed but formed a splendid oblong colony 4.9 m long by up to 2.4 m wide along a small terrace. They were very local but so numerous and closely spaced that despite being non-rhizomatous their leaf blades and ascending to decumbent culms overlapped, forming an attractive mat. Also found on this bank were a few plants each of *Carex pensylvanica* Lam., *C. hitchcockiana, Poa compressa* L. (Canada bluegrass), *Maianthemum canadense* Desf. (Canada mayflower), *Aster macrophyllus* L. (large-leaved aster), and *Solidago flexicaulis*, plus seedlings of *Fraxinus americana* and *Acer saccharum.* In this section of the woods either much of the groundlayer has been colonized too thoroughly by *C. pensylvanica* or the shrub layer of *Viburnum acerifolium* L. (maple-leaved viburnum) and *Taxus canadensis* Marshall (Canada yew) is so thick that many of the forest herbs are less common or not present.

Carex platyphylla was next collected by Andy Clark *(s.n.,* 3 Oct 1994, MICH, WIS) from a rich *Fagus grandifolia-Acer saccharum* community above the headwaters area of Piel Creek, 5 km [3 mi] NW of Baileys Harbor and 6 km [4 mi] NE of Egg Harbor, Door Co. He returned to the site the following year to collect a fertile specimen *(s.n.,* 25 June 1995, WIS). The stand included *Tsuga canadensis* (L.) Carrière (hemlock) and *Thuja occidentalis* L. (northern white-cedar) in the overstory. *Carex platyphylla,* said by Clark to be common, was associated with a large number of typical understory species, including *C. deweyana, C. gracillima* Schwein., *C. pensylvanica, C. plantaginea, Uvularia grandiflora* J. E. Smith (large-flowered bellwort), *Caulophyllum thalictroides, Viola pubescens,* and *Aster macrophyllus*, as well as the naturalized *Epipactis helleborine.*

In May 1998 E. J. Judziewicz showed me a specimen he had just collected *(12640,* 30 Apr 1998, WIS) from the edge of the interior cliff scarp on Rock Island. It came from a population of 15 plants located ca. 400 m [437 yds] NE of the Tower Clearing, where it grew with *Maianthemum canadense, Aquilegia canadensis* L. (wild columbine), and *Aster macrophyllus* in a mesic forest of pole-sized *Ostrya virginiana, Fagus grandifolia,* and *Acer saccharum* trees.

The next herbarium collection of *Carex platyphylla* was made by M. J. Grimm *(s.n.,* 7 May 1998, UWGB, WIS) from a recently logged *Quercus rubra-Fagus grandifolia-Acer saccharum* forest on the west slope of the escarpment 4 mi. SW of Egg Harbor. He had discovered a population of approximately 50 plants covering an area of about 70 by 70 meters. Most plants appeared to be in good growth even though the overstory had been removed the previous winter (Grimm pers. comm. 1998).

The most recent Wisconsin record is a collection made by Judziewicz *(13049,* 2 June 1998, WIS) from a good-quality second-growth *Acer saccharum-Fagus grandifolia-Betula papyrifera-Ostrya virginiana* woods halfway between Jack-

son Harbor and Washington Harbor on Washington Island. This population consisted of at least 75 plants spread over several places along small ridges at the site. Herbaceous associates include *Botrychium virginianum* (L.) Swartz (rattlesnake fern), *Carex albursina, C. laxiflora, C. rosea, Polygonatum pubescens* (Willd.) Pursh (Solomon's-seal), *Allium tricoccum* Aiton (wild leek), *Viola rostrata* Pursh, and *Solidago flexicaulis*, and are typical of the woods in which *C. platyphylla* grows.

Apparently *Carex platyphylla* occurs in several areas along the backbone of the peninsula: the vicinity of Kangaroo Lake (west side and north end); farther west, in the center of the county and on bluffs along Green Bay; and farther north, on Washington and Rock islands. It undoubtedly occurs elsewhere, probably mostly north of Sturgeon Bay and only where the dolomitic limestone is near the surface.

Michigan

The first Michigan collection was made in Van Buren County by L. H. Bailey *(s.n.* in 1891, BH; cited by Bryson 1980). However, Voss (1972) reported it from only a single locality in St. Clair County, where the species was collected many years later, first by F. J. Hermann, then by J. K. Hiltunen "from wooded slopes of the Black River valley west of Jeddo" (cf. Voss 1972, p. 296). Subsequent herbarium records are from Berrien *(Wells 7912,* MSC; cited by Swink & Wilhelm 1994; cf. also Thomas 1982), Leelanau *(Reznicek & Reznicek 8182,* MICH), and Van Buren *(Reznicek 7153,* MICH) counties. *Carex platyphylla* was associated closely with wooded sand dunes along Lake Michigan at all three stations. Near Bridgman in Berrien County, it grew in thinly wooded hollows in the high dunes of an area slated for destruction by mining for casting sand. Farther north, in Van Buren Co. (4.5 miles SW of Covert), the broad-leaved wood sedge was locally frequent on steep slopes of wooded dunes with *Acer saccharum* and *Tsuga canadensis,* whereas at the Leelanau County site (Alligator Hill Nature Trail, Sleeping Bear Dunes National Lakeshore) it was quite scarce; about 15 small plants grew on a low mound in a dry oak-maple forest.

Carex platyphylla in Illinois and Missouri?

Nothing is known about *Carex platyphylla* in Illinois apart from a single specimen, which, if the label be trusted, is from McHenry County (without specific locality, *G. Vasey,* without number or date, ILL). It is cited and/or mapped in various state publications (e.g., Jones & Fuller 1955; Mohlenbrock & Ladd 1978; Mohlenbrock 1986, 1999; Swink & Wilhelm 1994), but manuals generally omit Illinois and other Midwestern states from the range, as does Mackenzie (1931–1935). Exhaustive attempts to relocate *Carex platyphylla* in the Chicago region, including in remaining tracts of potentially suitable habitat in McHenry Co. (which, noteworthily, lies beyond the range of beech), have been unsuccessful (G. Wilhelm pers. comm. 1998), leaving its current status unsettled. Either the broad-leaved wood sedge still survives in Illinois but has not been relocated, or the taxon has vanished and should be listed as presumed extirpated, or it never was present in historic time.

The latter explanation seems likely. Most old Vasey specimens bear essentially similar labels ("Ex Herb. G. Vasey" or equivalent language) that were made out or annotated by someone else at a later time, either when receiving them in exchange or while working through stashes of specimens that had been stored in Vasey's herbarium. There is no assurance that any particular plant came from the city ("Ringwood Ill.") or county ("McHenry Co. Ill.") where the collector lived simply because his address was printed on standardized labels or added without comment by presumptuous herbarium workers. The *Carex platyphylla* specimen is such an example. It was labelled "Collected Dr. Vasey McHenry Co. Ill.," presumably by Brendel, and a probable duplicate in ILL, also originally part of Vasey's herbarium, was labelled (in different handwriting) simply "East." According to subsidiary labels automatically affixed to the left side of each sheet, they came to ILL via the Frederick Brendel Herbarium, which was purchased in 1914. Given Vasey's apparent deficiencies in processing and labelling specimens and the lack of an additional collection to confirm the presence of *C. platyphylla* in the state, I have chosen to exclude this record from the map (Fig. 1).

There is no ambiguity involved in the case of reports of *Carex platyphylla* from Missouri. This species was cited and mapped by Bryson (1980) from "Patapseo [sic] Valley," Howard Co., an implausible report that was subsequently repeated in published literature (Yatskievych & Turner 1990, Gleason & Cronquist 1991). An inquiry addressed to the U.S. National Herbarium confirmed my suspicion that the specimen in question (*Smith 82,* US) is actually from Maryland, as are two others collected by veteran Baltimore botanist J. D. Smith *(83, 84,* both US, but neither annotated by Bryson) that bear otherwise identical data. G. F. Russell (pers. comm. 1998) observed that the hand-written locality data could be misinterpreted, "Md." being misread as "Mo." and "Patapsco" as "Patapseo." The Patapsco River bisects Maryland from west to east and forms the entire northern border of Howard County, which lies within the Midland Zone of Maryland, wherein *C. platyphylla* is frequent (Shreve et al. 1910). Because Smith's collections undoubtedly came from this Howard Co., it is now necessary to delete *C. platyphylla* from the cumulative list of the Missouri flora. It should be noted that an independent investigation of this question by Yatskievych (pers. comm. 1998; 1999) arrived at the same conclusion.

ACKNOWLEDGMENTS

I am indebted to A. E. Schuyler for loaning specimens (PENN, PH) of *Carex platyphylla* and to the directors and curators in charge of herbaria where specimens have been examined on visits (MIL, OSH, UWGB, VDB) or have been photocopied (selected specimens in GA, ILL, MICH, MSC). I have received helpful information through the kindness of M. R. Penskar (a map of the Michigan distribution of *C. platyphylla)* and A. A. Reznicek (photocopies of Michigan and Ontario specimens in MICH). Dr. Reznicek also clarified questions about the geographical distribution in discussion. Special appreciation is extended to G. F. Russell, A. G. Jones, and J. E. Ebinger, who kindly checked for me the Smith and Vasey collections. I wish to thank K. E. Elliot for technical assistance with the map and B. J. Madsen, Penskar, and an anonymous reviewer for comments on an earlier version of this paper.

LITERATURE CITED

Andreas, B. K. 1989. The vascular flora of the glaciated Allegheny Plateau region of Ohio. Bull. Ohio Biol. Surv., n.s. 8(1): vii + 191 pp.

Ball, P. W. 1990. Some aspects of the phytogeography of Carex. Canad. J. Bot. 68: 1462–1472.

Braun, E. L. 1967. The Monocotyledoneae [of Ohio]. The Ohio State Univ. Press, Columbus. viii + 464 pp.

Brown, M. L., & R. G. Brown. 1984. Herbaceous Plants of Maryland. Book Center, Univ. of Maryland, College Park. xlvii + 1127 pp.

Bryson, C. T. 1980. A Revision of the North American Carex Section Laxiflorae (Cyperaceae). Ph.D. dissertation. Mississippi St. Univ., Mississippi State. ix + 191 pp.

Campbell, J. [J. N.] 1992. Atlas of the Kentucky Flora: First Release of Data on Ferns, Gymnosperms and Monocots. Printed by the author. [i–iii] + 3 pp. [Cyperaceae, maps 1–217.] [Photocopy.]

Chester, E. W., B. E. Wofford, R. Kral, H. R. DeSelm, & A. M. Evans. 1993. Atlas of Tennessee Vascular Plants Volume 1. Pteridophytes, Gymnosperms, Angiosperms: Monocots. Misc. Publ. No. 9: 118 pp. The Center for Field Biology, Austin Peay State Univ., Clarksville, TN.

Clarkson, R. B. 1966. The vascular flora of the Monongahela National Forest, West Virginia. Castanea 31: 1–119.

Deam, C. C. 1940. Flora of Indiana. Indiana Dept. of Conservation, Indianapolis. 1236 pp.

Doyon, D., & V. Lavoie. 1966. La distribution de quelques espèces végètales dans la région de Québec et leur cadre phytosociologique. Naturaliste Canad. 93: 797–822.

Duncan, W. H., & J. T. Kartesz. 1981. Vascular Flora of Georgia. Univ. of Georgia Press, Athens. ix + 143 pp. + index [unpaged].

Fernald, M. L. 1950. Gray's Manual of Botany. Ed. 8. Am. Book Co., New York. lxiv + 1632 pp.

Gleason, H. A. 1952. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. N. Y. Bot. Gard., New York. 3 vol.

_____, & A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Ed. 2. The New York Botanical Garden, Bronx, N.Y. lxxv + 910 pp.

Harvill, A. M., Jr., C. E. Stevens, & D. M. E. Ware. 1977. Atlas of the Virginia Flora, Part. 1. Pteridophytes through Monocotyledons. Virginia Botanical Associates, Farmville. iv + 59 pp.

Herkert, J. R. 1991. Endangered and Threatened Species of Illinois: Status and Distribution. Volume 1—Plants. Illinois Endangered Species Protection Board, Springfield. i + 158 pp.

Jones, G. N., & G. D. Fuller. 1955. Vascular Plants of Illinois. The Univ. of Illinois Press, Urbana. xii + 593 pp.

Jones, S. B., Jr., & N. C. Coile. [1988.] The Distribution of the Vascular Flora of Georgia. [ii] + 230 pp.

Link, E. G., S. L. Elmer, & S. A. Vanderveen. 1978. Soil Survey of Door County, Wisconsin. U.S.D.A., Soil Conservation Service and Univ. Wisconsin, Coll. Agric. Life Sci. iii + 132 pp. + 80 maps.

Mackenzie, K. K. 1931–1935. Cariceae. N. Amer. Flora 18: 1–478.

Michigan Endangered Species Program, Michigan Department of Natural Resources, & Michigan Natural Features Inventory. 1992. Michigan's Special Plants. Endangered, Threatened, Special Concern, and Probably Extirpated. Michigan Natural Features Inventory, Lansing. Photo Offset, [i +] 17 pp.

Missouri Natural Heritage Database. 1999. Missouri Species of Conservation Concern Checklist. Missouri Dept. of Conservation, Jefferson City. vi + 30 pp.

Mohlenbrock, R. H. 1986. Guide to the Vascular Flora of Illinois. Rev. and enlarged ed. Southern Illinois Univ. Press, Carbondale. vii + 507 pp.

_____. 1999. The Illustrated Flora of Illinois. Sedges: Carex. Southern Illinois Univ. Press. Carbondale. xiii + 328 pp.

_____, & D. M. Ladd. 1978. Distribution of Illinois Vascular Plants. Southern Illinois Univ. Press, Carbondale. vii + 282 pp.

Montgomery, F. H. 1945. A botanical survey of Waterloo County, Ontario. Trans. Royal Canad. Inst. 25: 217–265 + pls. 6–14.

New York Flora Association. 1990. Preliminary Vouchered Atlas of the New York State Flora. Ed. 1. The New York State Museum Institute, Albany. xiii + 496 pp.

Radford, A. E., H. E. Ahles, & C. R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. Univ. of North Carolina Press, Chapel Hill. lxi + 1183 pp.

Read, R. H. (with the collaboration of the Univ. of Wisconsin Herbarium). 1976. Endangered and Threatened Vascular Plants in Wisconsin. Sci. Areas Preservation Council, Wisconsin Dept. of Nat. Resources Tech. Bull. 92. 58 pp.

Rhoads, A. F., & W. M. Klein, Jr. 1993. The Vascular Flora of Pennsylvania. Annotated Checklist and Atlas. American Philosophical Society, Philadelphia, Pennsylvania. 636 pp.

Seymour, F. C. 1982. The Flora of New England. Phytologia Mem. 5: xvii + 611 pp.

Shreve, F., M. A. Chrysler, F. H. Blodgett, & F. W. Besley. 1910. Plant Life of Maryland. The Johns Hopkins Press, Baltimore, Maryland. 533 pp.

Skelton, E. G., & E. W. Skelton. 1991. Haliburton flora: an annotated list of the vascular plants of the county of Haliburton, Ontario. Royal Ontario Museum Life Sciences Misc. Publ. Toronto. 142 pp.

Small, J. K. 1933. Manual of the Southeastern Flora. The Univ. of North Carolina Press, Chapel Hill. xxii + 1554 pp.

Strausbaugh, P. D., & E. L. Core. 1952. Flora of West Virginia, Part I. West Virginia Univ. Bull. Ser. 52 (No. 12—2). 273 pp.

Swink, F., & G. Wilhelm. 1994. Plants of the Chicago Region. 4th ed. Indiana Academy of Science, Indianapolis. xiv + 921 pp.

Thomas, W. W. 1982. Identification of the species of Carex in Michigan's upland deciduous forests: a key stressing vegetative features. Michigan Bot. 21: 131–139.

Voss, E. G. 1972. Michigan Flora. Part 1. Gymnosperms and Monocots. Bull. Cranbrook Inst. Sci. 55 & Univ. Michigan Herbarium. xv + 488 pp.

Wisconsin Department of Natural Resources, Bureau of Endangered Resources. 1993. Guide to Wisconsin's Endangered and Threatened Plants. Wisconsin Dept. of Nat. Res. PUBL-ER-067. i + 128 pp.

Yatskievych, G. 1999. Steyermark's Flora of Missouri. Vol. 1. Rev. ed. Missouri Dept. of Conservation & Missouri Bot. Garden Press, Jefferson City, MO. xii + 991 pp.

_____, & J. Turner. 1990. Catalogue of the Flora of Missouri. Monogr. Syst. Bot. 37: xii + 345 pp.

ADDITIONS AND CORRECTIONS TO *MICHIGAN FLORA*, PART II

Edward G. Voss
University of Michigan Herbarium
North University Building
Ann Arbor, Michigan 48109-1057

The first printing of *Michigan Flora* Part II (first half of the dicots) having sold out (7000 copies), a second printing was produced early in 1998. It contains no changes in the original text, but does include three new pages (725–727) at the end, listing additional species and major typographical corrections. Exactly the same additional information is presented below, so those who own copies of the first printing may, if they wish, photocopy these pages and insert them in their copies. (A new fourth printing of Part I has also appeared, but there are no changes from the third printing, which included a list of additional species on page x, at the end of the Preface.)

NOTE TO THE SECOND PRINTING: ADDENDA

While updating of the distribution maps is not feasible at this time, the following list of additional species can be presented. These belong to families covered in this volume and have been documented (at least in the herbaria consulted) since 1985 as occurring outside of cultivation in Michigan. Species marked with an asterisk are not indigenous (or only questionably so) in this state. Recorded counties (or island groups) are in brackets.

*Myrica pensylvanica** [Monroe, Washtenaw]
*Juglans regia** [Leelanau (Manitou Is.)]
Quercus shumardii [Macomb, Monroe]
*Ulmus glabra** [Chippewa]
Rumex occidentalis [Marquette]
*Salsola collina** [Ottawa]
Froelichia floridana [Van Buren]
*Claytonia sibirica** [Houghton]
*Cerastium pumilum** [Calhoun, Ingham, Livingston, Oakland]
*Stellaria pallida** [Berrien, Lenawee]
Myosurus minimus [Hillsdale]
Thalictrum pubescens? [Kalkaska, Otsego, Wayne]
*Chorispora tenella** [Hillsdale]
*Coincya monensis** [Berrien]
Draba glabella [Keweenaw (I. Royale)]
*Malus baccata** [Lenawee, Mackinac]
*Rhodotypos scandens** [Washtenaw]
*Rosa canina** [Lenawee]
Rosa virginiana [Lenawee]
*Galega officinalis** [Saginaw]
*Lespedeza bicolor** [Macomb]
*Lespedeza thunbergii** [Clinton, Washtenaw]
*Pueraria lobata** [Allegan]
Callitriche terrestris [Washtenaw]
*Cotinus coggygria** [Benzie, Leelanau, St. Joseph]
*Acer ginnala** [Calhoun, Hillsdale, Mackinac, Washtenaw]

*Ampelopsis aconitifolia** [Wayne]
*Ampelopsis brevipedunculata** [Wayne]
*Daphne mezereum** [Ontonagon]
Shepherdia argentea (*?) [Alpena]
Rhexia mariana [Allegan, Ottawa]
*Heracleum mantegazzianum** [Ingham]
*Myrrhis odorata** [Leelanau; Mackinac (islands)]
*Pimpinella saxifraga** [Delta, Dickinson, Mackinac, Menominee]

NOTE TO THE SECOND PRINTING: CORRIGENDA

Omitting self-evident typographical errors and slips in formatting, the following corrections should be made to avoid misleading the reader. (These are not new information, but represent problems at the time of publication, such as gremlins that lost data as the manuscript was typed or maps made, consultation of an incomplete set of the Gray Index to new scientific names, and/or faulty proofreading.)

p. xi, line 7 from bottom: insert Robert W. Smith, Lenawee County
p. 14, insert in citations: Swink, Floyd, & Gerould Wilhelm. 1979. Plants of the Chicago Region, ed. 3. 1979. Morton Arboretum, Lisle, Ill. lxxiii + 922 pp.
p. 35, line 7 up: for "couplet 6" read "couplet 16"
p. 40, line 7 under *S. exigua*: authors of combination should be (Rowlee) C. Reed
p. 50, add to References: Wagner, Warren H., Thomas F. Daniel, & Joseph M. Beitel. 1980. Studies on Populus heterophylla in Southern Michigan. Michigan Bot. 19: 269–275.
p. 120, parenthetical clause at end of first paragraph should read: "or *Fallopia scandens* (L.) Holub"
p. 124, name at the end of the last paragraph should read: "*P. maculata* (Raf.) Á. & D. Löve."
p. 165: *Myosoton* should be numbered 7 (not 6) and all genera for the rest of the family be given one number higher as well.
p. 231, Loconte reference: Phytologia 49 is correct volume
p. 252, couplet 4 in key: 31 is correct number of *Lepidium* (also couplet 33 on p. 254)
p. 253, couplet 18 in key: 9 is correct number for *Sisymbrium*
p. 254, couplet 26 in key: 28 is correct number for *Draba*
p. 259, Map 331: add dot in Emmet Co.
p. 304, line 10: insert "as" between "round" and "in"
p. 335, legend for fig. 173, add: "fruiting head on twig ×1/2"
p. 346, line 18 under *R. parviflorus*: epithet should be *lacer*
p. 347, Map 465: the following block of counties was mysteriously lost in transferring data and all need dots: Hillsdale, Ingham, Isabella, Kalamazoo, Kent, Lapeer, Leelanau, Leelanau (Manitou Is.), Lenawee, Livingston, Mackinac (islands), Macomb, Monroe, Montcalm, Newaygo, Oakland
p. 351, first name in list should be *R. angustifoliatus*
p. 433, Map 567: the dot belongs on mainland of Keweenaw Co., not Isle Royale
p. 439, *Geum urbanum* author should be L.
p. 457, Map 601: dot in southern Michigan belongs in Wayne Co., not Washtenaw
p. 499, Lourteig reference: Phytologia 42 is correct volume
p. 502, *E. cicutarium* authors should be (L.) L'Hér.
p. 549, line 13: authors for var. *viride* should be (Schmidt) E. Murray
p. 574, line 2 under *Hibiscus*: epithet should be *syriacus*
p. 578, Map 811: delete dot in St. Joseph Co. and add Schoolcraft Co.
p. 581, Map 816: add dot in Houghton Co.
p. 598, *V. odorata* author should be L.
p. 633, second paragraph under *P. palustris*: at end of line 5 and middle of line 6, switch "short" and "long"
p. 696: insert Betula glandulosa, 67
p. 705: second page number for Gillis should be 533; insert Gillman, Henry, 208
p. 721: page number for Strophostyles helvula should be 461; insert Syringa, 319

THE BIG TREES OF MICHIGAN
20. Ostrya virginiana (Miller) K. Koch
Hop-hornbeam or Ironwood

Elwood B. Ehrle
Dept. of Biological Sciences
Western Michigan University
Kalamazoo, MI 49008

The largest known Hop-hornbeam or Ironwood in Michigan is located in Grand Traverse County of Michigan's Lower Peninsula.

Description of the Species: The Hop-hornbeam or Ironwood is a member of the Birch family (Betulaceae). In this family, the genus *Ostrya* is distinguished from the others by its grayish-brown, scaly bark; leaves which are slightly pubescent or nearly glabrous, narrowly to broadly oblong or ovate, short-acuminate, 4–12 cm. long, sharply and often doubly serrate; short-cylindric fruiting catkins; and spindle shaped nutlets (See Fig. 1). The bark of this species is particularly distinctive, being broken into long, vertical, shredded-looking strips; it is sometimes described as "cat-scratch bark".

Location of Michigan's Big Tree: Michigan's State Champion can be found in Grand Traverse County, Michigan, about four miles southeast of Interlochen. To find the tree, one may start from Interlochen, and take Karlin Rd. S. 2.5 mi. to Youker Rd. Turn east (left) and go 3.5 mi. to CR 633, turn south (right). Travel 1 mi. to Miller Rd., turn right and go 0.2 mi. Tree is on right (north) side of Miller Rd. nearly opposite #6375. This location is in Sec. 1, T25N, R12W.

Description of Michigan's Big Tree: The circumference of the tree at breast height was measured on July 27, 1995 with Dr. John Spencer of Traverse City at 115" (292 cm). The crown spread was 50′ (15 m), substantially less than the 88′ (27 m) previously recorded by Paul Thompson. The height was measured at 47′ (14 m), also substantially less than the 74′ (23 m) recorded by Thompson. Although crown size and height have decreased, its State Champion status remains secure because State Champion trees are determined by the circumference of the trunk at breast height alone.

INVITATION TO PARTICIPATE

If you would like to join us in extending this series of articles by visiting and describing one or more of Michigan's Big Trees, please contact Elwood B. Ehrle

FIGURE 1. Documented distribution in Michigan and characteristics of the Hop-hornbeam. Map is from Voss (1985). The star indicates the location of Michigan's Big Tree. Illustrations are from Barnes & Wagner (1991). 1. Winter twig, ×1; 2. Portion of twig, enlarged; 3. Leaf, ×1/2; 4. Flowering shoot, ×1/2; 5. Male flower, enlarged; 6. Female flower, enlarged; 7. Fruiting twig, ×1/2.

for help with locations, specifications for taking measurements and assistance with the manuscript. The Michigan Botanical Club encourages your involvement in this activity. Please remember to ask permission before entering private property.

DEDICATION

This series of articles is dedicated to the memory of Paul Thompson, Michigan's Big Tree Coordinator for over 40 years, who died in 1994.

LITERATURE CITED

Barnes, B. V., & W. H. Wagner, Jr. 1991. Michigan Trees. A Guide to the Trees of Michigan and the Great Lakes Region. Univ. of Michigan Press, Ann Arbor. viii + 383 pp.

Voss, E. G. 1985. Michigan Flora. Part II. Dicots. (Saururaceae-Cornaceae). Bull. Cranbrook Inst. Sci. 59 and Univ. Michigan Herbarium. xix + 724 pp.

ASTER NEMORALIS AND THE APPARENT HYBRID ASTER NEMORALIS × ASTER UMBELLATUS IN HOUGHTON COUNTY, MICHIGAN

Lynden B. Gerdes[1]

Forest Ecology and Management Program
School of Forestry
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931-1295

Previous Knowledge

Aster nemoralis Aiton (Asteraceae), Bog aster, is distributed in the northeastern portion of North America (Brouillet & Simon 1981), with Michigan representing the western edge of its range. According to Voss (1996), *A. nemoralis* is known from five eastern Upper Peninsula counties with Alger County representing its most western location. Comer and Albert (1993) report that *A. nemoralis* occurs in the Grand Traverse Bay dune and swale complex of Houghton County, but apparently a voucher collection was not made to document this occurrence.

The apparent hybrid, *Aster nemoralis* × *Aster umbellatus*, has not been previously reported in Michigan (Voss 1996) or elsewhere (Semple et al. 1996; Gleason & Cronquist 1991). In Ontario, Semple and Heard (1987) recognize *A.* ×*blakei* T.C. Porter, an apparent hybrid between *A. nemoralis* and *A. acuminatus* Michaux. Neither *A. acuminatus* or *A.* ×*blakei* are known to occur in Michigan. Gleason and Cronquist (1991) also recognize *A.* ×*blakei.* No other named or unnamed hybrids have been previously reported involving either *A. nemoralis* or *A. umbellatus* Miller. Both *A. nemoralis* and *A. umbellatus* are $2n = 18$. Semple et al. (1996) place *A. nemoralis* in the genus *Oclemena* and *A. umbellatus* in *Doellingeria* on the grounds of more distant relationships.

Significance

Aster nemoralis. The Houghton County, Keweenaw Peninsula collection of *A. nemoralis* extends the known range for this species three counties westward (ca. 90 km). The plants are abundant in several swales of a lacustrine deposited beach ridge/swale complex. Water near the ground surface has a pH of 4.8.

MICHIGAN. HOUGHTON CO.: *Aster nemoralis.* Grand Traverse Bay ridge and swale complex. Approximately 7 miles ESE of Lake Linden, MI and east of Rice Lake, 18 September, 1997, *L.B. Gerdes 2209* (MICH). Swale, primarily a *Sphagnum*/ericaceous bog (poor fen). Plants scattered and numerous with *Carex michauxiana* Boeckeler, *Carex oligosperma* Michaux, *Andromeda glaucophylla* Link, etc. Rays dark pink.

[1] Corresponding address: 10566 Highway 1, Isabella, MN 55607

Aster nemoralis × *umbellatus*. This collection represents the first occurrence of this hybrid combination. Based on Semple et al. (1996), it represents an intergeneric hybrid between *Oclemena nemoralis* and *Doellingeria umbellata*.

A. umbellatus, Flat-topped white aster, is considered to be widespread throughout most of Michigan (Voss 1996) and is common 60m north of the hybrid site in a mixed wetland complex. *A. nemoralis* occurs approximately 60m southeast of the hybrid site in a swale. No other *Aster* spp. were observed in the general area. Approximately twenty flowering plants of *A. nemoralis* × *umbellatus* were observed in a 10^2m area.

Diagnostic characters

For Asters, both *A. nemoralis* and *A. umbellatus* are quite morphologically distinct and easily recognizable. When the apparent hybrid *A. nemoralis* × *umbellatus* was first observed in the field, it too seemed morphologically unique and intermediate between the putative parents. The hybrid has long, pink colored ray flowers. The heads are large and are borne singly at the ends of long peduncles similar to those of *A. nemoralis*. The capitulescence is distinctly corymbiform like that of *A. umbellatus*. The overall plant height and leaf size and shape are intermediate between the assumed parents (Figure 1).

A. nemoralis × *umbellatus*. Herbaceous perennial with elongate rhizomes; stems single, weakly ascending to erect, ca. 70 cm. in height, 1.25–1.5 mm in diameter at mid-stem, sparsely hispid. Lower stem leaves smaller and deciduous at flowering; upper stem leaves numerous, sessile to short petiolate, narrowly elliptic, 45–55 mm long, 7–10 mm wide, entire; leaves strigose above and hispid/glandular below. Capitulescence corymbiform; peduncles unbranched or few-branched, densely hispid; heads single or few per branch. Involucres 5–6 mm high; phyllaries in 3–4 graduated series, pubescent, with chlorophyllous zone restricted to narrow band along the midvein; rays 12–15, light pink when fresh, 10–12 mm long, 2.5–3.0 mm wide; disc corollas ca. 20, 6 mm long, lobes 1.0 mm long, yellow; upper portion of limb sparsely pubescent. Achenes flattened, hispid; pappus white to buff, antrosely barbed, in a single whorl nearly equalling corolla.

MICHIGAN. HOUGHTON CO.: *Aster nemoralis* × *umbellatus*. Grand Traverse Bay ridge and swale complex, approximately 7 miles ESE of Lake Linden, MI and east of Rice Lake, 18 September, 1997, *L.B. Gerdes 2210* (MICH). Tamarack swamp adjacent to a *Sphagnum*/ericaceous swale. Approximately 20 plants with *Aronia prunifolia* (Marsh.) Rehder, *Chamaedaphne calyculata* (L.) Moench, *Alnus rugosa* (Duroi) Sprengel, *Calamagrostis canadensis* (Michaux) Beauv., and *Carex oligosperma* Michaux. *Aster nemoralis* and *Aster umbellatus* nearby. Rays light pink in color.

ACKNOWLEDGMENTS

I'd like to thank E.G. Voss for his confirmations of the collections. I'm also very grateful to him for his technical review, encouragement, and assistance in preparing this account. Thanks also to

Figure 1. *Aster nemoralis* × *umbellatus* (copied from *L.B. Gerdes 2210*, MICH), approx. 0.40× scale.

D. Lawson Gerdes, Barbara Madsen, Tony Reznicek and an anonymous reviewer for their suggestions and editorial assistance; and to Margaret R. Gale and Joan Schumaker-Chadde for sharing in these discoveries.

LITERATURE CITED

Brouillet, L., & J.-P. Simon. 1981. An Ecogeographical Analysis of the Distribution of *Aster acuminatus* Michaux and *A. nemoralis* Aiton (Asteraceae: Astereae). Rhodora 83: 521–550.

Comer, P., & D. Albert. 1993. A Survey of Wooded Dune and Swale Complexes in Michigan. Michigan Natural Features Inventory, Lansing, Michigan. 159 pp.

Gleason, H.A., & A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. 2nd ed. The New York Botanical Garden, Bronx, New York. 910 pp.

Semple, J.C., & S.B. Heard. 1987. The Asters of Ontario: Aster L. and Virgulus Raf. (Compositae:Astereae). Univ. Waterloo Biol. Ser. 30. 88 pp.

_____, S.B. Heard, & C.S. Xiang. 1996. The Asters of Ontario (Compositae:Astereae): Diplactis Raf., Oclemena E. L. Greene, Doellingeria Nees and Aster L. (including Canadanthus Nesom, Symphyotrichum Nees and Virgulus Raf.). Univ. Waterloo Biol. Ser. 38. 94 pp.

Voss, E.G. 1996. Michigan Flora, Part III, Dicots (Pyrolaceae-Compositae). Cranbrook Inst. Sci. Bull. 61 and the Univ. of Michigan Herbarium. 622 pp.

WOODLAND ANGELICA (*ANGELICA SYLVESTRIS:* APIACEAE), A POTENTIAL THREAT TO WETLANDS IN ONTARIO AND THE GREAT LAKES REGION

Daniel F. Brunton
216 Lincoln Heights Road
Ottawa, Ontario K2B 8A8

ABSTRACT

A well-established population of *Angelica sylvestris* discovered in 1993 near Ottawa, Ontario constitutes the first inland North American report of this European weed. Long known only from Cape Breton, Nova Scotia, *A. sylvestris* has recently been found spreading along roadsides into wetlands in at least two areas of southern New Brunswick. Although presently known only from the one site in central Canada, the potential exists for it to spread aggressively into wetlands in the Great Lakes region.

Key Words: *Angelica sylvestris*, Apiaceae, weeds, wetlands, Ontario, Great Lakes

INTRODUCTION

For many years Woodland Angelica, *Angelica sylvestris* L. (Apiaceae), has been known in North America only from the north end of Cape Breton, Nova Scotia (Fernald 1950; Gleason 1952). The species is suspected of having been imported here from France by 18th century settlers of Louisbourg for its reputed medicinal values (Erichsen-Brown 1979). It is particularly abundant in and about Louisbourg National Historic Park near Sydney where it grows commonly in cracks between cobblestones, among stone ruins, and as the dominant plant of low, moist meadows (personal observation). The abundance of *Angelica sylvestris* in disturbed wetlands lessens southward across Cape Breton but it can be found in roadside ditches at least as far south as the Halifax County area in central mainland Nova Scotia (personal observation).

Scoggan (1979) reports an unconfirmed sighting at Bonaventure, Gaspé, Québec as the only other location for this species in Canada. It is, however, more recently reported as "*rapidly spreading along roadsides and waterways*" in the Fredericton and St. John areas of New Brunswick (Hinds 1986).

The discovery of a large population of *Angelica sylvestris* in the Regional Municipality of Ottawa-Carleton, Ontario in 1993 constitutes a substantial westward extension of range of this species. Its occurrence in southern Ontario has important implications for Great Lakes region wetlands. Although a popularized version of this report was produced for an eastern Ontario/ western Quebec publication (Brunton 1997), the potential significance of *A. sylvestris* to wetland conservation in central North America and the need for notification of the Great Lakes botanical community underlined the need for a subsequent publication.

RESULTS

Angelica sylvestris was discovered in 1993 in the Regional Municipality of Ottawa-Carleton in southeastern Ontario (Brunton 1997), constituting the first report of this species in interior North America (Figure 1). It occurs in Gloucester, Ottawa-Carleton [45°19′N 75°37.5′W], growing commonly in wet, peaty sand along ditches on either side of Leitrim Road immediately west of Albion Road (*D.F. Brunton 11,727*, 9 September 1993—DAO, TRT, DFB [D.F. Brunton personal herbarium]). Hundreds of towering *Angelica* plants dominate almost a hectare of clearings in the scrubby swamp forest south of the Leitrim Road site (Figure 2). The native herbaceous vegetation at this site, including *Eupatorium maculatum* L., *Matteuccia struthiopteris* (L.) Todaro and *Solidago rugosa* Mill., has been overwhelmed by the growth of *Angelica.*

IDENTIFICATION

The huge size of this plant (Figure 2), its finely ternately-bipinnate leaves (Figure 3) and huge flowering head (Figure 4) eliminate all but a handful of other species from consideration for identification purposes. *Angelica* species have conspicuously inflated leaf petioles, unlike most species likely to be confused with them. The similar *Heracleum maximum* Bart. also shares this inflated leaf-base characteristic, but has wider, much less broadly-divided leaves. So too does the huge *H. mantegazzianum* Somm. & Lev., an introduced species which is known from an increasingly large number of sites in Ontario and elsewhere in the Great Lakes area (Morton 1978; Voss 1985). *Heracleum mantegazzianum* can be readily separated from *Angelica* by its abundant and conspicuous stiff, sharp, pustulate-based stem bristles, purple-spotted leaf stalks, and huge (up to 50 cm across) umbels.

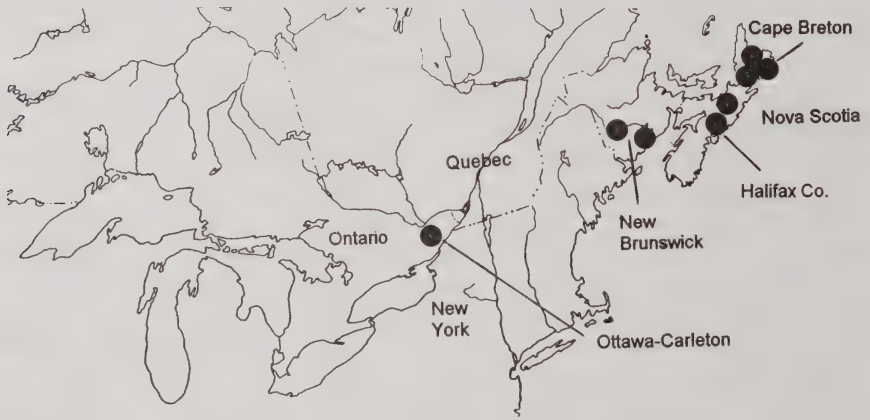

FIGURE 1. Distribution of *Angelica sylvestris* in eastern Canada and North America (from Roland and Smith 1969; Hinds 1986; personal observation).

FIGURE 2. K.L. McIntosh standing in the dense stand of *Angelica sylvestris* along Leitrim Road, Gloucester, Regional Municipality of Ottawa-Carleton (September 1993).

FIGURE 3. Dissected (ternately-bipinnate) leaves of *Angelica sylvestris*.

FIGURE 4. Flowering umbel of *Angelica sylvestris*.

A number of the 60± *Angelica* species found in temperate regions around the world have been domesticated (e.g. *A. archangelica* L. and *A. sylvestris* in Europe). Others, like *A. atropurpurea* L. in eastern Canada and the northeastern United States, are used in traditional aboriginal treatments for a variety of ailments and concerns (Erichsen-Brown 1979). The latter is found uncommonly in much of southeastern Canada. Other eastern North American *Angelica* species

include *A. venenosa* (Greenway) Fern., which is rare in Ontario and Canada (Oldham 1996) and *A. archangelica* (*A. laurentiana* Fern.), a native in Newfoundland/Labrador and adjacent eastern Quebec (Scoggan 1979). *Angelica lucida* L., another northern and eastern taxon, occurs in northeastern North America along the Atlantic coast and in the James Bay region of Hudson Bay.

The Ontario *Angelica sylvestris* plants were distinguished from other species in that genus by the unique combination of morphological characteristics summarized in the following key adapted from Scoggan (1979), Fernald (1950), and Gleason (1952). The key has been modified by personal observations and the examination of herbarium specimens. Mature fruit are important for the sure identification of *Angelica* species and are emphasized in the key.

Key to *Angelica* species in eastern Canada and the adjacent United States

1. Fruit only slightly flattened, with thick lateral wings and dorsal ribs (native species along Atlantic Ocean and subarctic coastal beaches)..... ***A. lucida***
1. Fruit strongly flattened with thin lateral wings and narrow dorsal ribs (native and introduced species of wider ranges);
   2. Leaves, stem (at least upper), and flower pedicels velvety pubescent (minute, broad-based, clear to white hairs) .....3.
   2. Leaves, stem, and flower pedicels glabrous or essentially so .....4.
      3. Fruit pubescent; 3–6 oil tubes in intervals between dorsal ribs; leaf segments 1–3 cm wide (native species of upland woods) .....***A. venenosa***
      3. Fruit glabrous; solitary oil tube in intervals between dorsal ribs; leaf segments 2–8 cm wide (introduced in open, wet sites) .....***A. sylvestris***
         4. Fruit >6 mm long; fruit wall (pericarp) loose around seed; seed with 20+ oil tubes.....5.
         4. Fruit 5.0–5.5 mm long; fruit wall (pericarp) tightly fused to seed surface; seed with ±5 oil tubes (introduced in open, wet sites) ..... ***A. sylvestris***
            5. Fruit 6.0–10.5 mm long; fruiting/flowering umbel hemispherical; summit of prominent dorsal ribs on seed overtopping stylopodium (native Atlantic coastal species) .....***A. archangelica***
            5. Fruit 6.0–7.0 mm long; fruiting/flowering umbel spherical; summit of subdued dorsal ribs on seed shorter than stylopodium (widespread native species) ..... ***A. atropurpurea***

Characteristics of *Angelica sylvestris* seeds provide diagnostic identification features. The combination of few oil tubes (±5) and the pericarp fused to the seed surface is unique to this species. Since the obscuring pericarp of *A. sylvestris* is difficult if not impossible to remove intact from the seeds, the number of oil tubes is best (and surprisingly easily) viewed in a cross-section of the fruit (a 10× hand lens is sufficient).

DISCUSSION

Angelica sylvestris is considered to be a common plant of fens in Great Britain and elsewhere in western Europe and does not appear to be particularly aggressive in its native range (Clapham et al. 1987). It clearly *is* aggressive in Nova Scotia and New Brunswick, however (Crompton et al. 1988; White et al. 1993). It is also well established and has spread along roadside ditches at the Ottawa-Carleton, Ontario site. A September 1993 survey of similar habitat along roadsides within several kilometers of the site, however, revealed no additional populations. A single *A. sylvestris* plant grown in cultivation in Ottawa since 1994 annually produces large quantities of well formed, apparently viable seed (personal observation). Until we know how aggressively invasive this species may become, however, it remains unclear whether or not *A. sylvestris* constitutes a new menace akin to Purple Loosestrife (*Lythrum salicaria* L.) or Frog's-bit (*Hydrocharis morsus-ranae* L.) for Great Lakes region wetland communities (White et al. 1993).

Curiously, Marsh Sow-thistle (*Sonchus palustris* L.), another huge plant of European fens and also a new species to Ontario (and North America), was discovered only a few hundred meters away from the Leitrim Road *Angelica sylvestris* site (Brunton & Crompton 1993). It is unclear if there is any connection between these two occurrences.

At the very least, the Ottawa-Carleton population should be monitored carefully in the coming years. Field botanists should also be alert to the possibility of populations of this potentially threatening species developing in other sites in the Great Lakes region, particularly in and near fen habitats.

ACKNOWLEDGMENTS

My thanks to Karen L. McIntosh for her assistance in the field and her helpful review of the manuscript, and to the Biological Resources Division of Agriculture Canada for permission to examine the appropriate specimens in the DAO herbarium.

LITERATURE CITED

Brunton, D. F. 1997. Woodland Angelica (Angelica sylvestris) new to the Ottawa District and Ontario. Trail & Landscape 31: 151–156.

_____, & C. W. Crompton. 1993. Marsh Sow-thistle, Sonchus palustris L. (Asteraceae) in Ontario: An addition to the introduced flora of North America. Canad. Field-Nat. 107: 341–344.

Clapham, A.R., T.G. Tutin, & D.M. Moore. 1987. Flora of the British Isles (3rd ed.). Cambridge Univ. Press, Cambridge. 688 pp.

Crompton, C.W., J. McNeill, A.E. Stahevitch, & W.A. Wojtas. 1988. Preliminary inventory of Canadian weeds. Tech. Bull. 1988- 9E, Research Branch, Agric. Canada, Ottawa. 292 pp.

Erichsen-Brown, C. 1979. Use of plants for the past 500 years. Breezy Creek Press, Aurora, [Ontario]. 512 pp.

Fernald, M. 1950. Gray's Manual of Botany (8th ed.). American Book Company, Boston. 1632 pp.

Gleason, H.A. 1952. The new Britton and Brown illustrated flora of the northeastern United States and adjacent Canada, Volume 2: choripetalous dicotyledoneae, Saururaceae to Cornaceae. New York Botanical Garden, New York. 665 pp.

Hinds, H.R. 1986. Flora of New Brunswick. Primrose Press, Fredericton. 886 pp.

Morton, J.K. 1978. Distribution of the Giant Cow Parsnip (Heracleum mantegazzianum) in Canada. Canad. Field-Nat. 92: 182–185.

Oldham, M.J. 1996. Natural heritage resources of Ontario: Rare vascular plants of Ontario, Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough.

Roland, A.E., & E.C. Smith. 1969. The flora of Nova Scotia. Nova Scotia Museum, Halifax. 743 pp.

Scoggan, H. J. 1979. The flora of Canada Part 4: Dicotyledoneae (Loasaceae to Compositae). Nat. Mus. of Nat. Sci. Publ. in Botany 7(4) 1117–1711.

White, D.J., E. Haber, & C.J. Keddy. 1993. Invasive plants of natural habitats in Canada. Canadian Wildlife Service, Environment Canada, Ottawa. 121 pp.

REVIEW

THE ASTERS OF ONTARIO (COMPOSITAE: ASTEREAE): *Diplactis* Raf., *Oclemena* E. L. Greene, *Doellingeria* Nees, and *Aster* L. (including *Canadanthus* Nesom, *Symphyotrichum* Nees, and *Virgulus* Raf.) John C. Semple, Stephen B. Heard, and ChunSheng Xiang. University of Waterloo, Biology Series No. 38. 1996. viii + 94 pages. [no ISBN] U.W. Biology Series, Department of Biology, University of Waterloo, Waterloo, Ontario, N2L 3G1, Canada, price not given.

A glance at the title will suggest that soon you won't be able to walk along a country lane in late summer and name the wildflowers any longer. "They're constantly changing the names" was the lament of my undergraduate Botany professor; only later did I figure out that most of the name changes he so regretted came about from proper application of the rules of priority in the International Code of Botanical Nomenclature.

Now the game has changed again: when we factor in findings from chloroplast DNA sequences, along with morphology and chromosome number, we gain insights into probable phylogenies. The genera we erect should include species of common descent, and only those—that's not in the Code, it is just assumed to be self-evident. The contrary may also be argued, that Latin names are simply labels we apply to facilitate talking about what's out there in the world, and monophylesis is irrelevant. Advocates for this latter line of thinking are scarce on the ground.

The phylogenetic analyses are given fully (without the underlying data, whose inclusion would probably have doubled the size of the book!) on page 3. If it is any consolation to the field botanist, the number of accepted genera just in Ontario could have been almost twice as large. The fact remains that most of traditional *Aster* survives in this treatment.

In all fairness, one must point out that the segregate genera given in the title are nearly all a century or more old; only *Canadanthus* (not here recognized) is a modern coinage. Long before things like computers, Dollo Parsimony, and Wagner Parsimony were dreamed of, the classic botanists of the nineteenth century with a 10× lens saw these same discontinuities in nature. They were guided by intuition and "feeling," both of which have their place and both of which suf-

fer from a lack of rigor. Computer programs fed the same data supply the missing rigor—or so it is claimed.

In any case, the keys work. The descriptions are most ample. The illustrations are very helpful. The bibliography is ample. Places and dates of publication of the names are not given but can easily be got elsewhere. There are six nomenclatural novelties included. Unfortunately, the reduction of *Canadanthus* Nesom to subgeneric status under *Aster* (on page 36) gives the wrong page number and no date for the Nesomian basionym, and is therefore invalid. (I suspect Professor Semple will have detected this and published a correction by the time this review appears in print.) The citation of *Aster ericoides* (L.) Reveal & Keener (page 84) is just a slip; the species still stems from Linnaeus alone, bless his heart.

In matters nomenclatural, it may be appropriate to issue a warning: the dates on the covers of some journals (like Phytologia) are sometimes not the actual dates they were mailed, and thus became available to the botanical public. Two of the four Nesom papers cited from Phytologia have a cover date that is "incorrect," in a manner of speaking. If one cites the papers with their real dates, and puts the erroneous title-page date within quotes inside square brackets immediately afterward, it might save some trouble later. As always, one need only take Ed Voss as a model (Michigan Flora. Part III. page 486).

Brace yourselves: when the volumes (yes, plural) of Asteraceae for the new Flora of North America appear, *Aster* the way you thought you knew it is going to be a dozen or so genera. As Semple points out (Preface, page vii), it is just a very big pain [in one's nether anatomy] if common *Aster azureus* has some day (but not here) to be called *Symphyotrichum oolentangiense*. Bad enough that it has to be *Aster oolentangiensis*, by the rules of priority.

The authors are to be congratulated for having reduced great masses of data to an intelligible synthesis. They are not to be faulted for following where the data lead. Let us pray that no whiz-kid comes along within the next year or two and demonstrates that chloroplast DNA restriction site analysis is not the phylogenetic clue we think it is. But *if* it happens, remember you read it here first.

——Neil A. Harriman
Biology Department
University of Wisconsin-Oshkosh
Oshkosh, Wisconsin 54901

WHAT MEANS THIS NAME?
Butterwort
(Pinguicula vulgaris L.)

Ruth B. (Alford) MacFarlane
1916 Ridge Avenue
P.O. Box 99
Mass City, Michigan 49948-0099

Plants are given their names for a variety of reasons, perhaps for a striking color, a fancied resemblance, a habitat, a classical reference, or a usage. A name that came to my attention, provoking questions, was "butterwort."

The purple flowers resemble snapdragons, having their petals arranged in two lips with a spur behind, and are borne singly on leafless scapes that arise from a rosette of leaves.

Butterwort's formal name is *Pinguicula vulgaris* L. It belongs to the plant family Lentibulariaceae, along with bladderwort, which is a flowering plant that grows in tangled mats in summer ponds. Butterwort grows on wet rocks and shores and in bogs and wet meadows from Labrador to Alaska and south to New England, New York, Michigan, Minnesota, and Washington (Gleason 1963). The leaves are fleshy, yellowish-green, greasy in appearance and slimy to the touch. It is claimed that small insects caught on the slimy leaf surfaces are digested by the plant (Smith 1961).

Gerard's Herbal, first written in 1633, read, "Butterwort . . . groweth in our English squally wet grounds, and will not yeeld to any culturing or transplanting: it groweth especially . . . upon the bogs and marish grounds, and in the boggie medowes . . . and also in the fens. . . . [It] is called *Pinguicula*, of the fatnesse or fulnesse of the leafe, or of fatning. . . . The husbandmens wives of Yorkshire do use to anoint the dugs of their kine with the fat and oilous juice of the herbe butterwort, when they are bitten by any venomous worme, or chapped, rifted, and hurt by any other meanes. They say it rots their sheepe, when for want of other food they eat thereof."

Gray's Botany (Fernald 1950) told me that the name *Pinguicula* came from the Latin word, *Pinguis*, meaning "somewhat fat," from the greasiness of the leaves.

Another old book (Britton and Brown 1898), said that butterwort was found, at that time, "on wet rocks or in gravelly rivulet beds, Newfoundland and Labrador to Alaska, south to Vermont, northern New York, Minnesota and British Columbia. Also in Greenland, Europe, and northern Asia. Other English names are Beanweed, Sheep-root or -rot, Rot-grass, Sheep-weed, and Steep- or Earning grass, from its use in curdling milk."

From the American West, Morton Peck (1961) described the plant's distribution as, "On wet rocks and in bogs, circumpolar, southward to the mountains of southern Curry Co."

Edward Voss (1996) wrote of its distribution, "[*Pinguicula vulgaris*] is a circumpolar boreal species . . . a distinct calciphile, growing on alkaline rocks . . .

and sands . . . marly flats, and occasionally in marly fens and on moist rock outcrops inland from the Great Lakes, although most sites in Michigan are along the cool shores." Describing the plant, Voss wrote, "Enzymatic secretions from glands on the upper surface of the leaves aid in digestion of insects and other little creatures that try to land or stroll on the sticky surface. The yellowish green color of the leaves . . . enhances the slippery, buttery aspect, and the leaves are said to coagulate milk. 'Butterwort' is a doubly appropriate common name."

The *World Book Encyclopedia* (1953) said, "Butterwort . . . leaves produce a sticky substance which attracts insects. When an insect settles on a leaf, the edges curve in and trap it. The insect dies and is digested as food for the plant. . . . The leaves are used to curdle milk in Sweden and Lapland."

A friend of a friend (Dane 1973) wrote that in Norway, "The base leaves [of butterwort] are crushed, placed in a small quantity of unpasteurized milk and left to stand in a place cooler than room temperature. When the milk reaches a thick, slimy consistency you have a starter that can be used with any quantity of milk. Kept in a *cool* place the milk will reach the same consistency and will be preserved this way for a considerable period of time. It's a bit slimy with an acidic edge to its taste. You can crush flatbread into it and sprinkle sugar on top of it for a real tasty treat."

The most pleasing answer came from a beautifully illustrated book about the travels of Carl Linnaeus.

In his journal for 13 June 1732, on a journey to Lapland, Linnaeus wrote (Black 1979), "In the neighborhood [of Umea] grows *Pinguicula*. When the inhabitants of these parts once procure this plant, they avail themselves of it throughout the whole year; for they preserve it dried during the winter; and use it as a kind of rennet till the return of spring."

Today, people of Finnish descent commonly culture a starter called *viilia*, which will convert milk to a yogurt-like consistency, and is considered a very healthful food. Doubtless the original starter was cultured from butterwort.

BIBLIOGRAPHY

Black, D., Ed. 1979. Carl Linnaeus Travels. Illustrated by Stephen Lee. Nature Classics, Charles Scribner's Sons, New York. 108 pp.

Britton, N. L., & A. Brown. 1898. An Illustrated Flora of the Northern United States, Canada, and the British Possessions, vol. 3. Charles Scribner's Sons, New York. 588 pp.

"Butterwort." 1953. The World Book Encyclopedia, vol. 2. Field Enterprises, Chicago. 1098 pp.

Dane, Korine. In letter to Mary Giles, January 31, 1973. Included in Giles, Mary. Letter to Ruth Alford [MacFarlane], February 2, 1973.

Fernald, M. L. 1950. Gray's Manual of Botany, Ed. 8. American Book Co., New York. lxiv + 1632 pp.

Fitter, A. 1987. Collins New Generation Guide to the Wild Flowers of Britain and Northern Europe. Collins, London. 320 pp.

Gerard, J. 1633. The Herball or General History of Plants. The Complete 1633 Edition as Revised and Enlarged by Thomas Johnson. Dover Publications, Inc. New York. 1631 pp. + Index & Appendices.

Gleason, H. A. 1963. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada, vol. 3. Hafner Publ., New York. 595 pp.

Peck, M. E. 1961. A Manual of the Higher Plants of Oregon. Ed. 2. Binsford & Mort, Publ. & Oregon State Univ. Press & National Sci. Found. 936 pp.

Smith, H. V. 1961. Michigan Wildflowers. Cranbrook Inst. Sci. Bull. 42. 468 pp.

Voss, E. G. 1996. Michigan Flora Part III Dicots (Pyrolaceae–Compositae). Cranbrook Inst. Sci. Bull. 61 & Univ. Michigan Herb. 622 pp.

EDITORIAL NOTICE

There is good news and bad news about *The Michigan Botanist*. First, the bad news: The journal continues to be well behind in its publishing schedule (this issue will appear in May 2000), primarily owing to a lack of manuscripts. The slow rate of appearance of journal issues has made some people fearful that the journal was going out of business, thus making them hesitate to send in manuscripts, which has only made the problem worse. In addition, in a few cases the review process has taken rather longer than it should have (partly owing to health and other problems on the part of the editor).

Now, the good news: *The Michigan Botanist* is not going to disappear anytime soon (at least, not if I have anything to say about it)! A recent influx of manuscripts means that we will be able to start to catch up on our publishing schedule. I urge you to add to this momentum by submitting any appropriate manuscripts you may have on hand or be working on, and to encourage your colleagues to do likewise. It's only through your contributions that the journal will be able to get back onto schedule and stay there. In addition, some of my earlier problems have been worked out or eliminated, so it should be possible to get manuscripts processed more quickly.

More good news: The article in this issue by longtime Michigan Botanical Club member and author Ruth Alford MacFarlane inaugurates what I hope will be a new series in *The Michigan Botanist*, exploring the meanings and origins of the "common" names of some of our native species. Some of these English names are obvious; others are obscure and mysterious. Some species seem to have only one "common" name; other have many aliases. If you've ever wondered about the origins or meanings of these names, I urge you to do some investigating, as Ruth did, then enlighten the rest of us.

The January 1997 issue (Vol. 36, No. 1) was mailed October 30, 1998.
The March/May 1997 issue (Vol. 36, Nos. 2/3) was mailed February 18, 1999.
The October 1997 issue (Vol. 36, No. 4) was mailed January 18, 2000.

CONTENTS

On the cover: *Butterwort* (Pinguicula vulgaris). *Photographed by Kerry Walter.*

Vol. 37, No. 2

THE MICHIGAN BOTANIST

March, 1998

THE MICHIGAN BOTANIST (ISSN 0026–203X) is published four times per year (January, March, May, and October) by the Michigan Botanical Club, c/o Herbarium, North University Building, The University of Michigan, Ann Arbor, MI 48109–1057. Second-class postage paid at Ann Arbor, MI. POSTMASTER: Send address changes to *THE MICHIGAN BOTANIST*, c/o Herbarium, North University Building, The University of Michigan, Ann Arbor, MI 48109–1057.

Subscriptions: See below. Single copies: $4.00.

Back issues are available except as noted below. Prices are: Vols. 1–13, $3.00 per vol. ($0.75 per no.); Vols. 14–18, $5.00 per vol. ($1.25 per no.); Vols. 19–21, $8.00 per vol. ($2.00 per no.); Vols. 22–31, $10.00 per vol. ($2.50 per no.); 32–present, $16.00 per vol. ($4.00 per no.).

The following issues are available only in complete sets or in sets beginning with Vol. 2 (marked as *): 1(1, 2 – all published), 2(1*, 4*), 4(3*), 5(1*, 2*, 3*), 7(4*), 9(3*), 19(3), and 26(3).

Institutional subscriptions and all orders for back issues should be addressed to the Business and Circulation Manager.

Address changes should be sent to the Business and Circulation Manager.

Articles dealing with any phase of botany relating to the Great Lakes Region may be sent to the Editor. In preparing manuscripts, authors are requested to follow our style and the suggestions in "Information for Authors" (Vol. 28, p. 43; Vol. 29, p. 143).

THE MICHIGAN BOTANICAL CLUB

Membership in the Michigan Botanical Club is open to anyone interested in its aims: conservation of all native plants; education of the public to appreciate and preserve plant life; sponsorship of research and publication on the plant life of the State; sponsorship of legislation to promote the preservation of Michigan native flora; establishment of suitable sanctuaries and natural areas; and cooperation in programs concerned with the wise use and conservation of all natural resources and scenic features.

Dues are modest, but vary slightly among the chapters and with different classes of membership. Persons desiring to become state members (not affiliated with a local chapter, for which contact persons are listed below), may send $17.00 dues to the Membership Chairperson listed below. In all cases, dues include a subscription to *THE MICHIGAN BOTANIST*. (Institutions desiring to subscribe should deal directly with the Business and Circulation Manager.) Foreign subscribers should remit in U.S. funds.

President: Elwood B. Ehrle, Biological Sciences Dept., Western Michigan University, Kalamazoo, MI 49008
Treasurer: David A. Steen, Biology Department, Andrews University, Berrien Springs, MI 49103
Membership Chairperson: Alta Lahner, 6088 Old Log Trail, Kalamazoo, MI 49009
Huron Valley Chapter: Irene Eiseman, 1873 Pierce Road, Chelsea, MI 48118
Red Cedar Chapter: Hal Juran, P.O. Box 1395, East Lansing, MI 49104-0410
Southeastern Chapter: Margaret Converse, 34084 Dorais, Livonia, MI 48154
Southwestern Chapter: Sharon Heaney, 409 S. Cass, Berrien Springs, MI 49103
White Pine Chapter: Dorothy A. Sibley, 7951 Walnut, Newaygo, MI 49337

"THE BEGINNING OF AN ARTIFICIAL FORESTRY IN MID-19TH CENTURY MICHIGAN"

THE CONTRIBUTIONS OF W.J. BEAL TO SILVICULTURE

Frank W. Telewski

Associate Professor and Curator
W.J. Beal Botanical Garden and Campus Woody Plant Collection
Department of Botany and Plant Pathology
Michigan State University
East Lansing, MI 48824

The loss of the native forests and timber resources to logging in the eastern and midwestern United States by the mid and late 1800's was cause for an increased interest in both conservation and forest regeneration. In Michigan, the northern half of the Lower Peninsula was cleared of white and red pine with the first wave of lumbering, and a second wave of hardwood cutting was underway by the close of the 1880s. Support for forestry programs was in its infancy at the federal level. However, a greater degree of support was developing within states of the affected area. Activities developed to stimulate the regeneration of cut-over forest lands received much attention at the state level and were supported by research at higher educational institutions. Michigan State Agricultural College (MAC) Professor of Botany, W.J. Beal[1] was very concerned about the extensive harvesting of trees and loss of forested land (Figure 1). Shortly after his arrival in East Lansing, Dr. Beal realized the need to explore the possibility of growing trees to regenerate the forests that had been lost, and to encourage farmers to begin planting trees as a potential crop. Professor Beal expressed these concerns several times in his annual reports to the Michigan State Board of Agriculture, as well as a need to develop test plantings, including an arboretum, with the specific intent of determining how best to grow trees capable of producing timber in Michigan. In his 1876 report (Beal 1876), he stated: "I think this raising of forest trees is a promising field to demand our attention. When these different kinds of trees are well started some people of our State will want to learn how each variety thrives, that they may plant also. Indeed it does not now seem too soon for some farmers to be starting for profit, a plat of hickories, black walnuts, and white ashes, and perhaps chestnuts, European larches, and others." By 1888, Dr. Beal's title was expanded to Professor of Botany and Forestry. He continued to teach forestry and wood anatomy as single courses at M.A.C. for

[1] Michigan State Agricultural College, often referred to as Michigan Agricultural College (MAC), was founded in 1855. After passage of the Morrill Act of 1862, it became the first Land Grant Institution. In 1925, the name was changed to Michigan State College (MSC) and in 1954 to Michigan State University (MSU). William James Beal, a Michigan native and student of Asa Gray, joined the faculty of MAC in 1870 and remained until 1910. (Detailed historical accounts of Michigan State can be found in: Beal 1915, Kuhn 1955, Hannah 1980, Dressel 1987.)

FIGURE 1. Professor Beal standing among white pine stumps at Grayling, Michigan in the spring of 1888. (Photo credit: Michigan State University Archives and Historical Collections)

twenty years until the Department of Forestry, under the direction of Professor Ernst E. Bogue, was formed with a distinct curriculum in 1902.

DEVELOPMENT OF THE ARBORETUM

A professional interest in silviculture led to what Professor Beal referred to as "the beginning of an artificial forestry" (Beal 1875a), and his first experiment in the field of "artificial" forestry was the development of The Arboretum on the campus of Michigan Agricultural College in 1873[2]. Little was known regarding

[2] The date of establishment of The Arboretum varies in Professor Beal's annual reports from 1873 to 1877. Professor Beal gives two dates for the beginning of The Arboretum, 1873 and 1875, in his book, *History of the Michigan Agricultural College*. The most widely cited date is 1875. However, as is evidenced in Beal's 1873 annual State Board of Agriculture Report, the production of seedlings began off site in 1873 and actual planting on the site was reported in the fall of 1874. These dates are corroborated by data presented in the Notes on Arboretum, by V.R. Gardner (1903). Therefore, if the germination of trees to be planted in The Arboretum is considered the beginning of the planting, a founding date of 1873 must be accepted.

the growth requirements and hardiness of tree species, especially non-native species introduced from Europe and Asia. Beal acknowledged these facts and set out to begin defining the growth requirements for both native Michigan trees and trees from other regions of the U.S., Europe, and Asia. The studies in silviculture began with the germination of tree seeds in a nursery bed in 1873[3]. These seedlings were later transplanted to The Arboretum after 1874. The first plantings in The Arboretum began in the fall of 1874 with the planting of two rows of swamp white oak (*Quercus bicolor*) acorns. In subsequent years, seeds and seedlings collected from a variety of sources were planted directly in The Arboretum. Dr. Beal repeated his concern for the need for improved silviculture in his 1877 report regarding progress in the arboretum:

> "It is too early in the history of our State to make much of a stir on this subject. Timber is abundant in many portions of the State, and the stumps in the neighboring fields have not yet rotted; still, many a thoughtful farmer and mechanic is interested to know that we are making a small beginning. The time is rapidly coming in which good, straight, second-growth ash, hickory, larch, etc., will bring a high price even in Michigan"(Beal 1878a).

Trees were planted in The Arboretum in rows running south to north, four feet apart (Beal 1878a, 1880) on a parcel of land just east of a grove of swamp white oak to the north of the brick dwelling-houses on campus. This location is south of Michigan Avenue and west of the Abbott Road entrance and today is bounded by Campbell Hall to the southeast, a parking drive to the south, Mayo Hall to the west, and Michigan and Grand River Avenues to the north. Professor Beal platted and recorded The Arboretum in his field book which was later transcribed and typed in 1903 by Dr. V.R. Gardner, Chair of the Department of Horticulture (Beal 1880, Gardner 1903). Unfortunately, Professor Beal's original book has apparently been lost; however the typed transcription of Dr. Gardner has survived. The soil of The Arboretum was described as a naturally well drained sandy loam. A dirt road which coursed through the site had removed the topsoil along the road's path, creating an interesting comparison for tree growth on disturbed and non-disturbed soils (Beal 1880, Gardner 1903).

By the third year, The Arboretum consisted of one and a quarter acres of land with plans to expand the site in the following year (Beal 1876). The focus of the collection was on trees and shrubs native to Michigan and/or species which would be hardy in the climate of central Michigan. In 1875, in addition to species collected within the region, 35 species, including foreign species, were received from Professor C.S. Sargent of the Bussey Institute, Massachusetts. With a particular interest in timber species, Professor Beal included plantings of European larch (*Larix decidua*), black walnut (*Juglans nigra*), hickory (*Carya* sp.), basswood (*Tilia* sp.), chestnut (*Castanea* sp.), catalpa (*Catalpa* sp.), box elder (*Acer negundo*), white ash (*Fraxinus americana*), sugar maple (*Acer saccharum*), swamp white oak, and American beech (*Fagus grandifolia*). During

[3]Two hundred taxa of foreign tree and shrub seeds were received from the Royal Botanical Garden at Kew and an additional sixteen from the U.S.D.A. All were planted in the nursery in 1873 (Beal, 1875b).

TABLE 1. Measurements of arboretum trees recorded and reported by Professor Beal (1879a, 1886). Heights are reported in feet, diameters are reported in inches.

Year	1879			1886		
Species	Ht.	Dia.	Age	Ht.	Dia.	Age
Swamp white oak	3	1.75	4	12	2	11
White ash	8	4.5	3	28	4	10
Basswood	8	4	3	25	4.5	10
Sugar maple	3.5	1.7	3	18	2	10
Butternut	5.5	4	3	18	3	10
Chestnut	3.6	2.5	3	22	7	10
Black walnut	3.6	2.5	2	16	3.5	9
Catalpa	13.5	10	6	28	10	13
Silver maples	18	11.25	4	35	10.5	12
Hickory	0.7	-.-	2			
Box elder	8.5	8	5			
Ailanthus	12	12	4			
Black Cherry				17	3	7
White Pine				15	2.5	9
Red Elm				30	6.5	14
Poplar birch				30	6	13
Balsam poplar				30	6	12
European larch				28	7	13
Locust				25	4.5	7

the summer of 1876, The Arboretum was increased to about two acres (Beal 1878a).

By 1878, The Arboretum was reported to contain about five hundred species, but this estimate was reduced to around two hundred and seventy five in 1879[4] (Beal 1878a, 1880). A species list prepared from existing records is presented in Appendix 1. Beal understood the value of his collection of trees in education and demonstration, using the plantation to introduce students and visitors to the potential of growing trees as a crop. To increase the educational value of the planting, all the trees in The Arboretum were labeled in 1878. Labels were made from painted zinc strips seven to ten inches long and three inches wide, and were attached directly to larger trees in the collection by one nail through the label and three holding the edges, providing movement of the label as the tree increased in girth. Smaller specimens were labeled using 3×3 inch pine stakes two feet long, the ends of which were dipped in coal tar and

[4]The total number of taxa planted in The Arboretum will probably never be known, as the numbers reported by Professor Beal in his annual reports vary widely, and the original planting notebook appears to be lost. Part of this variation may be a reflection of the additions of new taxa which did not survive more than a few years and were removed from subsequent inventories. The best estimate of the taxa planted is represented by the species list in Table 1. Many of the taxa represented are nonhardy species which would have not survived the Michigan winters. The hardiness of these taxa were unknown at the time and the testing of hardiness was and still is an important function in silvicultural studies.

pitch (Beal 1878a). In the spring of 1879 some of the trees and shrubs growing in The Arboretum were transplanted to the expanding collection of woody plants (Campus Woody Plant Collection) installed around buildings and in groupings on the lawn of the campus. Again, Professor Beal acknowledged the contributions of trees and seed from Professor C.S. Sargent, who assumed the duties of the Director of the Botanic Gardens and Arnold Arboretum of Harvard University by 1878 (Beal 1878b). Additional plant material for The Arboretum planting was secured from regional sources, the U.S.D.A., and the Royal Botanic Gardens, Kew, Surrey, England.

The last reported planting dates were 1888 and 1890, and represented collections of willow (*Salix* spp.) and dogwood (*Cornus* spp.) cuttings received from the Forestry Division of the U.S.D.A. (Beal 1891a, 1891b). There appear to be no more additions to the collection after 1890. In 1886, Professor Beal wrote of The Arboretum: "Of the various things attempted since my connection with the Agricultural College few have given greater satisfaction, considering the outlay of time and money, than the selection and growing of trees" (Beal 1886). By this time, he was Professor of both Botany and Forestry. The Arboretum contained 215 taxa of trees and shrubs, many of which were not represented elsewhere on campus. Since the seeds and seedlings were planted so close together, regular thinning of The Arboretum was conducted. This included cutting out trees and moving trees onto the campus. The Arboretum was also cultivated regularly in mid-August and again in late autumn between the rows of trees to reduce the growth of weeds (Beal 1886).

Twenty years after its establishment, Beal reported that all cultivation of the Arboretum had ceased, but some thinning continued (Beal 1894). Twenty-five years after initiating this experiment, Beal reported his findings in a paper presented to the Society for the Promotion of Agricultural Sciences meeting held in Boston in 1898. The paper was entitled "Notes concerning a few trees in The Arboretum at the Agricultural College" (Beal 1899a). This is the summary paper in which he presents a quarter century of observations regarding the growth of trees. After four to six years, the best growth was observed in black walnut, catalpa, red elm (*Ulmus rubra*), and butternut (*Carya cinerea*). After 11 years, the growth rate of the butternut declined, catalpa was damaged by the cold, the chestnuts were not healthy, but black locust (*Robinia pseudoacacia*) and European larch showed much promise. After 23 years, he recommended the planting of chestnuts with a mix of box elder, evergreens, or beech to shade the ground and keep down the growth of weeds and grasses. He also recommended the planting of ". . . white ash, white pine, Norway pine for poor sand, and white oak, shag-bark hickory, basswood and sugar maple for suitable places."

In 1898 the Board of Agriculture gave permission to the Professor of Horticulture, L.R. Taft, to fence in about two acres of land consisting of the wood lot to the west of the Arboretum and the south-western corner of The Arboretum for a deer park. Deer and elk were introduced to the site. As suggested by Professor Beal, the activities of the deer caused considerable damage to the wood lot and Arboretum (Figure 2) (Beal 1900). After thirty-five years of growth, Professor Beal expressed concern for the future of The Arboretum given the recent distur-

FIGURE 2. Rows of trees in The Arboretum Professor Beal started in 1873 can be seen behind the deer digging at the base of young trees during a winter in the early 20th century. (Photo credit: Michigan State University Archives and Historical Collections)

bances. Feeling the pressures of the growing college, Professors Beal and Bogue realized the value of the land occupied by the planting and feared it would be sought for building or other purposes. Anticipating this change, an annex arboretum was planted by Professor Bogue south of the Red Cedar River east of the Pere Marquette railway spur shortly after his arrival at M.A.C. as head of the newly created Forestry Department in 1902 (Bogue 1903, Beal 1907). Today, the remains of this arboretum annex are located to the east and north of Wells Hall and north of the International Center.

The original Arboretum (Figure 3) has survived the development of a dormitory complex during the 1930s and loss of the southern ⅓ of the total area to a parking lot. An inventory of trees was conducted during the spring of 1996 and compared to the original planting plans. A total of 69 original trees have survived, including 19 sugar maples, two black maples (*Acer nigrum*), two Norway maples (*Acer platanoides*), one tartar maple (*Acer tataricum*), five Tree-of-Heaven (*Ailanthus altissima*), three shagbark hickories (*Carya ovata*), one hackberry (*Celtis occidentalis*), two white ash, one northern red ash (*Fraxinus pennsylvanica* var. *austini*), one blue ash (*Fraxinus quadrangulata*), four black walnuts, one black cherry (*Prunus serotina*), seven white oaks (*Quercus alba*), 15 swamp white oaks, one red oak (*Quercus rubra*), one black oak (*Quercus velutina*) and one possible hybrid cross of butternut and black walnut (*Juglans nigra* × *Juglans cinerea*).

FIGURE 3. Rows of sugar maple trees can still be seen in the Arboretum. These particular trees were planted by Professor Beal in 1875. Students of Michigan State University use the Arboretum for education and recreation. (Photo credit: Bruce A. Fox)

THE STATE FORESTRY COMMISSION

Dr. Beal presented papers on forest preservation and tree planting at meetings of the State Horticultural Society, partly based on his experiments on tree growing in The Arboretum. It was these presentations that stimulated the public to pressure the Michigan Legislature into action (Garfield 1905). In 1887, a bill was introduced into the Michigan Legislature by the Honorable N.A. Beecher of Flushing, Genesee County creating an Independent Forestry Commission within the State Board of Agriculture (Reynolds 1888). The objectives of the commission were defined in sections 2 and 3 of the legislation:

> "SEC. 2. It shall be the duty of said Forestry Commission to institute an inquiry into the extent to which the forests of Michigan are being destroyed by fires, used by wasteful cutting for consumption or for the purpose of clearing lands for tillage or pasturage. Also as to the effect of the diminution of the wooded surface of the land upon ponds, rivers, and water power of the State, and in disturbing and deteriorating the natural conditions of the climate. Also as the protection of denuded regions, stump and swamp lands."

> "SEC. 3. Said Commission shall make report of the results of their inquiries to the Governor of the State, together with such legislation as seems to them expedient to propose to preserve and restore the forest wealth of the State, sixty days before the assembling of the legislature for the year eighteen hundred and eighty-nine, and the State printer, under the direction of said Commission, shall cause to be printed as many copies of said report for distribution as they may deem expedient."

Professor Beal was appointed co-Director of the Commission along with Mr. Charles. W. Garfield, a colleague of Beal's at M.A.C.[5] Together, they organized the first state Forestry Convention held in Grand Rapids on January 26th and 27th, 1888. The purpose of the convention was to meet the objectives of the new Commission outlined in the original law. Speakers presented papers on the state of Michigan's forests, the markets for wood products, requirements for growing trees, and protection of trees from forest fires. Bernhard E. Fernow, Chief of the Division of Forestry, U.S.D.A., was an invited speaker and presented a paper entitled "Proper Basis of Forestry Legislation" (Fernow 1888).

Professor Beal traveled extensively in Michigan gathering information and facts for the required Report of the Forestry Commission, due in Lansing 60 days prior to the meeting of the legislature. His survey of the jack pine plains of Michigan was conducted from a canvas-topped lumber wagon crossing from Harrisville on the Lake Huron shore to Frankfort on Lake Michigan. This region of Michigan once supported the great pineries of the state, but became a wasteland following logging and the subsequent fires which swept the area. In addi-

---

[5] In 1888, feeling the pressures on his time for teaching, research, and management of the Botanic Garden, Arboretum, Museum and Herbarium, Professor Beal reported to the Honorable Edwin Willits, President of MAC, that co-director of the Forestry Commission, C.W. Garfield, was in ". . . continued bad health . . ." which ". . . has made it impossible for him to render the assistance that both of us had anticipated." He continued by stating "The work of this commission has been very pleasant and no doubt very profitable, but it has taken time which I had hoped to give to the study of other subjects. I need not tell you that the position assigned to me in this commission was neither sought nor desired" (Beal 1888c).

tion to surveying the extent of damage that lumbering and fire had caused to the sandy soils, he was also keen to find grass species which could flourish in these sands[6]. Beal was accompanied by four other botanists, including former student Liberty Hyde Bailey who was preparing for his professorship at Cornell; Mr. Charles F. Wheeler, a pharmacist and Michigan flora authority; and two of Beal's students, Lyster H. Drewey and Daniel A. Pelton. Their travels were recorded and published in the Detroit Tribune and Free Press by reporters who traveled with the group. This trip resulted in Beal authoring a publication entitled "The flora of the Jack-Pine plains of Michigan" (Beal 1888a).

The final report of the Forestry Commission, edited by Dr. Beal and Mr. Garfield, and authored primarily by Beal, was 92 pages long and contained observations, line drawings, and plates covering topics including: Forest management in southern Michigan, Forest fires, Observations on the succession of forests in northern Michigan, Large trees, The names of pine trees as known to lumbermen, Cutting and removing logs for lumber, A lumber camp, New uses for certain kinds of timber, The amount of pine yet remaining in Michigan, List of trees and shrubs belonging to Michigan, Trees and shrubs of Michigan compared with those of the rest of the world, Why has Michigan so many and Great Britain so few?, and Questions sent to supervisors and their replies (Beal and Garfield 1888).

The recommendations of the commission focused on section 3 of the act providing for a forestry commission. The first called for a repeal of the duties of the commission related to the collection and compilation of information from township supervisors, instead giving authority to the commission to identify the most reliable sources for any required information. The second called for a law prohibiting burning by persons clearing land during the period from April first to November first without the written consent of the township supervisor and notice to owners of adjoining lands. The third recommendation called for authorization to investigate the possibility of acquiring land on behalf of the State for forest preserves. The final recommendation requested additional funding to support the work of the commission through 1890.

Fernow would later comment that Michigan was the third state to initiate state-wide legislation related to forestry and forest regeneration; however, the first Forestry Commission was voted out of existence by the State Legislature in 1892 due to public pressure. Ironically, in an article published in Michigan Natural Resources Magazine (Horstik 1987), Professor Beal was erroneously credited with writing a letter in response to the Forestry Commission's questionnaire. Horstik (1987) cites this letter as one of the reasons leading to the repeal of the Commission, and falsely credits Professor Beal with the following statement: "Reforesting a large area is such a preposterous project that you would not wish to father it, I know." In fact, this quotation is from Mr. A. C. Glidden of Paw Paw, Michigan. The quotation was contained in a letter in response to Professor

[6] In addition to his interest in trees and forests, Professor Beal was an authority on the grasses, primarily because of their importance as a forage crop. He published a two-volume series, *Grasses of North America* (Beal 1887, 1896), and the botanical garden on the MSU campus named in his honor was initiated in 1873 as a collection of grasses.

Beal's Forestry Commission survey question #6: "Is reforestation desirable in your section?" (Beal and Garfield 1888). A subsequent article (Sodders 1995) perpetuated this error and stated: "Legislative reaction to Beal's statement led to repeal of the Forestry Commission Act, and efforts to re-establish our forests were postponed for another 12 years." This statement is false. The responses of some of the County supervisors, such as Mr. Glidden's, to the Commission's survey regarding enacting Forestry Legislation were negative. However, Professor Beal never discouraged reforestration, nor did he call for the repeal of the Forestry Commission. He was firmly committed to the ideals of the Commission and authored the recommendations for expansion and land aquisition presented above. Unfortunately, this error has been propagated and has appeared in interpretive programs at the North Higgins Lake State Park state nursery site.

In a report presented in 1895 to the Farmers' Institute entitled "Some needs of forestry", Professor Beal stated the need to re-establish the Commission. A resolution was adopted at the conclusion of the meeting requesting a reinstatement of a forestry commission (Beal 1895a). Action in the state was delayed until 1899. In that year, a permanent forestry commission of three was appointed and charged with the task of submitting a bill in 1901 to the state legislature to carry out a forest reservation policy to include 200,000 acres of state tax homestead lands and swamp lands owned by the state. Although the original bill was defeated, a second bill introduced in 1903 enabled the Commission to secure 70,000 acres in Roscommon and Crawford counties as a start towards a statewide forestry policy (Fernow 1902). Dr. Beal participated in the new Forestry Commission, contributing papers in the 1902 and 1903–4 Reports, but never served as a member of the new Commission (Beal 1903, 1905a, 1905b).

EXPERIMENT STATION PLANTATIONS

The year following the first Forestry Convention must have been a very busy and fruitful year for Professor Beal. In that spring, he was ready to apply some of the knowledge gained from the arboretum experiment and that shared during the January meeting at a series of experiment stations established in the late 1880s across the northern half of Michigan's Lower Peninsula. This region, dominated by sandy soils, was difficult to farm or to support natural forest regeneration. On May 15, 1888, Beal planted 35 taxa from the Iowa Agricultural College from stock originating from central Russia (Beal 1888b, Anonymous 1913) on a rented parcel of land at Grayling, MI. Beginning on May 22, 1888 he planted an additional 5260 trees and cuttings representing forty-one taxa on a 4 acre portion of the 80 acre experiment station in Grayling (Crawford County, the southwest corner of Section 17, T26N R3W, shown in Figure 4). Three different site preparation methods were tested. One acre of land was intensively prepared by plowing. A second one-acre site, containing a few scattered jack pines (*Pinus banksiana*), scrub oaks (*Quercus ellipsoidalis*), and shrubs, was passed over once with a spring-toothed harrow which was reported to tear up the soil but left intact many of the existing trees

FIGURE 4. A view of the Grayling, Michigan experiment station in the spring of 1888. (Photo credit: Michigan State University Archives and Historical Collections)

and shrubs. Beal described the land and preparation as "land once harrowed with spring tooth harrow. No grubbing. Jack pines numerous in places. The piece is about 40 rods long, about 5 rods wide at the east end and 14? Rods wide at west end and lies north of the trees in the plowed land." The third site received no cultivation. The trees were planted in rows spaced 4 feet apart and the trees four feet apart within rows, as in The Arboretum on the MAC campus. The experimental design alternated evergreens, shade-loving trees, and shade-intolerant trees between and within the rows. Eventually, the planting was reported to consist of 76 taxa (Beal 1888b, Anonymous 1913).

Additional plantations were planned for the Experiment Substations at Oscoda, on an upland site south of the Au Sable river near the shore of Lake Huron and on a ten-acre parcel one half mile north of the Village of Harrison which is located approximately 48 miles south of Grayling (Beal 1888b). The Oscoda plantation was established in the spring of 1889 on a ten acre parcel of farmland given to the State Board of Agriculture by James Barlow. This planting consisted of white pine (*Pinus strobus*), Norway spruce (*Picea abies*), red pine (*Pinus resinosa*), box elder, locust and pitch pine (*Pinus rigida*) (Beal 1889a).

FIGURE 5. The Grayling plantation as it looks today. Rows of mature trees are surrounded by their progeny. (Photo credit: Frank W. Telewski)

All three Experiment Substation plantations have survived in some form to the present day. The Oscoda plantation was incorporated into the Huron-Manistee National Forests, River Road National Forest Scenic Byway. The plantation was harvested in the early 1980s. However, several mature red pines were left as seed trees, and sapling black locust and pitch pines were found among seedling jack pines and rows of stumps on four foot centers during a site visit in the fall of 1997. The site is adjacent to the parking area and trail head for the Eagle Run Trail System. The Harrison plantation is located on private property just to the north of Budd Lake and to the east of an old railroad grade. It is a one-acre planting consisting of 18 mature red pines planted in rows. This plantation was burned twice early in the 1900s as is evidenced by fire scars at the base of the trees. The Grayling planting has survived in the best condition of the three plantations. The original four-acre plantation is now owned by the State of Michigan (Figure 5). In addition to the native jack pine of the area, red pine, white pine, Scots pine (*Pinus sylvestris*), and Norway spruce are all regenerating among the mature trees planted in 1888.

PLANTATION EXPERIMENTS ON THE CAMPUS OF M.A.C.

The fourth experimental plantation was made to the south of The Arboretum on the M.A.C. campus in the spring of 1890. This planting consisted of box el-

FIGURE 6. This and the cover photo of the Beal Pinetum were originally published in U.S.D.A. Annual Report of the Office of the Experiment Stations for the year ending June 30, 1901. This photo shows the white pine plantation in 1898 and the cover photo shows the plantation as it appeared in 1901. (Photo credit: Michigan State University Archives and Historical Collections)

ders, eastern white pine, and Norway spruce. Beal intended for the box elders to provide shade to keep weeds and grass under control, minimizing the need for cultivation. Eventually the conifers were supposed to overtop the box elders; however, the box elders grew too fast for the evergreens on this site (Gardner 1903).

Professor Beal decided to experiment with the box elder and white pine combination once again and established a "small model forestry plantation" (Smith 1895) in 1896 on 2.2 acres along the Red Cedar River east of the M.A.C. campus (Figure 6). The original plan was to cultivate the pines in a grid of 10×12 feet for a few years and then plant box elders between the wide rows of pines. In addition to the pines, four rows of bitternut hickories (*Carya cordiformis*) were also planted on this site (Smith 1897). In the fall of 1896, the U.S.D.A. sent a collection of seeds representing trees collected from different regions of the U.S. These were planted in the spring of 1897 in between the rows of pines instead of the box elders. The object of this planting was that of a 'common garden experiment', to determine what differences, if any, could be observed in the trees of the same species collected from different regions (Smith 1897, 1898). Two years after the pines were planted, the plantation was maintained free of weeds during the summer and the trees had attained a height of 10 to 16 inches (Smith 1898).

The fate of the common garden experiment is unknown, and Beal reported

that he would go ahead with his original plan to plant box elders in the spring of 1902 (Beal 1901a). A single row of year-old box elders was planted between every other row of pines. An additional planting of hardwoods and conifers was made north of the pine plantation on 'a piece of river bottom one hundred and twenty square rods in extent' (Beal 1902). Beal described the planting as being a mixture of trees mostly of silver maple (*Acer saccharinum*), box elders, and basswoods with a smaller number of arbor-vitae (*Thuja occidentalis*), balsam fir (*Abies balsamea*), hemlock (*Tsuga canadensis*), Norway spruce, white spruce (*Picea glauca*), red cedar (*Juniperus virginiana*), larch, and white pine. These trees were planted on a four-foot by four-foot grid and cultivated (Beal 1902). Today, the plantation of eastern white pines and mixed planting to its north are known as the Beal Pinetum.

In 1911, the state foresters of Michigan placed a bronze plaque in the northwest corner of the pinetum in honor of Dr. Beal and in recognition of his contributions to forestry, declaring him 'The Father of Michigan Forestry' (Figure 7). One hundred years after their planting, the pines stand over 100 feet tall (Figure 8). A second growth of hardwoods forms a dense understory about two-thirds of the height of the pine canopy. Many of the pines have been infected by root rot fungi; however, rows of trees on a ten-foot by twelve-foot grid can still be observed. Just to the north of the pinetum can be found rows of silver maples and basswoods with an occasional white pine representing the 1902 addition.

PUBLICATIONS AND PRESENTATIONS

Most of Dr. Beal's research was recorded in his Annual Reports to the State Board of Agriculture or as bulletins of the Michigan Agricultural College or Forestry Commission, in which he reported on the growth of trees in The Arboretum and encouraged his readers to plant trees. In one of his bulletins from 1889 (Beal 1889b) entitled "Why Not Plant a Grove?", Professor Beal closes by asking; "Reader, if not already done, will you not plant a grove this year, or do something to induce some of your friends to plant one? The writer will be glad to give any further instructions in his power on this subject, and would consider it a favor to receive a postal card from any who contemplates a grove" (Beal 1889b). He also lectured extensively on the subject of growing trees at national meetings and Farmers' Institute meetings around the state, encouraging farmers and land owners to plant trees and create wood lots. Convincing people to plant trees at the end of the 19th century was no easy task. At one of his lectures presented in a northern Michigan schoolhouse entitled "Our Forests", Beal was introduced by the chairman of the meeting as "the man who has come to tell us what to do with these woods of ours, how to get rid of the nuisances so we can plant corn." Obviously, this was not at all the message of the presentation. The chairman left halfway through the talk (Kuhn 1955).

The first progress report on tree growth in The Arboretum was published in 1876 in the Michigan State Board of Agriculture Annual Reports, recording the

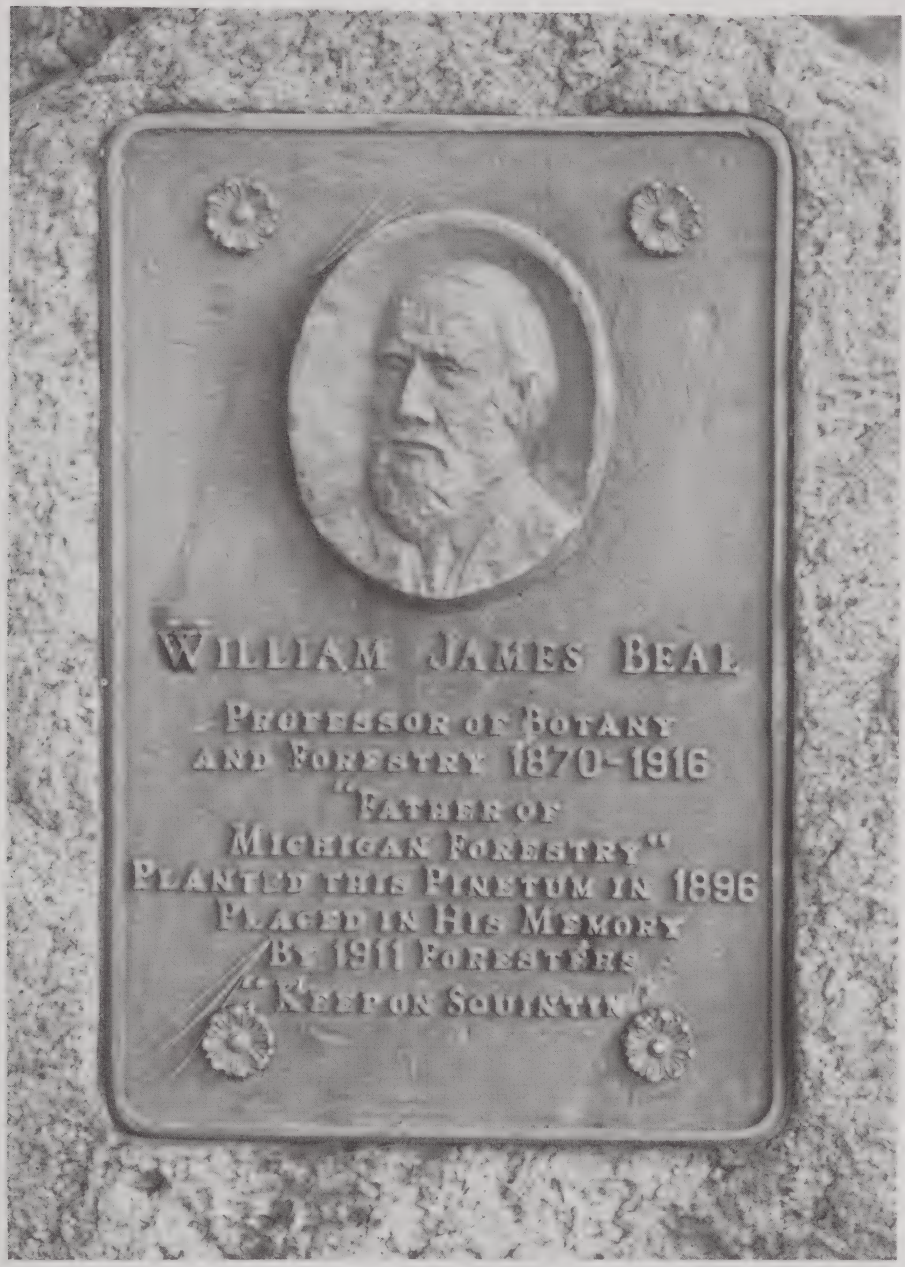

FIGURE 7. The "1911 Foresters" of Michigan placed this bronze plaque in the northwest corner of the Beal Pinetum on the campus of Michigan State University in honor of Dr. Beal and declared him 'The Father of Michigan Forestry'. (Photo credit: Bruce A. Fox)

FIGURE 8. Standing tall after 100 years, the white pines of the Beal Pinetum continue to grow. (Photo credit: Bruce A. Fox)

first two to three years' growth of seedlings (Beal 1876). By 1879, Beal published a more detailed description of growth of thirteen species, including swamp white oak, white ash, basswood, sugar maple, butternut, chestnut, black walnut, shagbark hickory, catalpa, red elm, silver maple, and Tree-of-heaven (*Ailanthus altissima*) (Table 1). Of the Tree-of-heaven, he wrote: "This is tender, diseased, and will very likely soon die down to the ground" (Beal 1879a). The fact that five of these original trees have survived for over 100 years, and are in excess of two feet in diameter proves his assumption of this potentially weedy species to be wrong. The report included a table of height and diameter growth for the different species. Michigan Agricultural College Bulletin No. 21, entitled "Lessons on growing forest trees", was published by Professor Beal in 1886. Within this bulletin, Beal stated with regard to his Arboretum experiment:

> "Till a person begins to plant and cultivate trees and shrubs, as here attempted, he does not realize how little any one in this country knows about the best sorts to select and how to treat them from the seeds to mature trees. For want of information mistakes have been made, but even these mistakes often teach as much as the successes. Whether Michigan men ever grow forest trees for profit or not, the information acquired in growing an arboretum has already been the means of helping to answer many inquiries, and is likely to help in answering many more" (Beal 1886).

The report identified some of the factors influencing species hardiness in Michigan, methods of seed collecting and times of sowing, effects of cultivation, and the influence of stocking densities on lower leaf retention and tree form. The influence of stocking densities and leaf retention on weed growth and a reduced need to cultivate led Beal to consider "nurse" trees. Later experimental plantings using box elders and white pines were conducted to test the possibility of using an alternate tree species to reduce the need for weed removal (Beal 1886).

Seed viability was another area of interest of Beal's.[7] The viability and longevity of tree seeds was relatively unknown, prompting him to experiment (Beal 1895) and report on the viability of black oak acorns and other species. Additionally, he included observations on seed dispersal by wind or birds. He also presented another summary table reporting on height and diameter growth of 16 forest tree species after 10 years of growth (Table 1) (Beal 1886).

In 1893, Professor Beal published two papers related to forestry. The first, published in the journal *The Engineering Magazine,* was entitled "Conditions of forestry as a business." In this article, he defined forestry, reviewed forestry practices and regulations in Europe, asked what could or should be accomplished in the United States, called for more research on tree growth and the conditions that influence growth, and endorsed more forestry programs at agricultural colleges to achieve effective state and national forestry programs. He also called for use of the various state Farmers' Institute programs as a vehicle for increasing awareness of the need to plant forests. Beal was a supporter of state and federal legislation regarding implementation of forest policy and clearly stated his position in this article (Beal 1893a). However, feeling the sting of the demise

[7] Among the many contributions of Professor Beal is his long-term seed viability study . Started in 1879, it is now the longest continuously running seed viability study (Beal 1879b).

of Michigan's first forestry commission in 1892, Beal wrote; "Something may be done by forestry commissions, but too much is likely to be expected of them, and, to save expenses, somebody will advocate their abolition—and somebody will sooner or later usually succeed. The value of forestry commissions consists largely in giving advice and in educating the people" (Beal 1893a). The second paper, "A forestry fortune: Our wealth of commercial woods" was a popular account of the trees of Michigan and their uses (Beal 1893b).

A paper presented at the Farmers' Institutes in 1895 entitled "Some needs of forestry" addressed Beal's concerns regarding the state of forestry in Michigan, drawing on many themes developed in earlier papers (Beal 1895). In this presentation, later published in the Michigan State Board of Agriculture Annual Reports in 1895, Beal defined forestry, outlined the need within the state, and continued to encourage the audience to plant trees and manage woodlots. It was also during this presentation that Beal called for and received a resolution to create a new state forestry commission (Beal 1895).

In 1899, the first Forestry Bulletin was produced by M.A.C. (Smith 1899). Beal contributed a paper on the methods of regenerating pine stump lands (Beal 1899b). Within this article he acknowledged that natural regeneration could occur in many instances, but stated that the natural process was slow and 'often imperfect'. Beal identified "seven problems" which needed to be addressed in order to facilitate proper forest management and perfect regeneration:

"1. What kinds of trees shall we plant; shall they be native or foreigners?"
"2. How many shall we plant to the acre?"
"3. What preparations shall we give the land?"
"4. How shall we care for the trees, from seedlings to maturity?"
"5. How shall we plant to best advantage, and at what season of the year?"
"6. How large shall the trees be when planted, or shall we rely on sowing and planting seeds?"
"7. Shall we plant one kind of tree on an acre, or shall we plant several kinds?"

To address the first question, Beal drew from his experiments on growing trees on the M.A.C. campus and from the experiences of Professor C.S. Sargent, Director of the Arnold Arboretum and long-time contributor to Beal's forestry experiments. Beal quotes Sargent as initially being very supportive of growing exotic timber species in the 1870s, but retracting support for exotics in favor of species native to Massachusetts by the mid 1880s. A similar recommendation was made for reforestation in Michigan by Beal. He also acknowledged the early success in planting a grove of chestnuts, butternuts, and black walnuts achieved by Professor James Satterlee in Greenville, Montcalm County in 1863. In addition, Beal recommended the planting of ". . . aspens and other poplars, with a view of using the timber for paper pulp." Site evaluation and selection were also noted for influencing the selection of species to be planted. The easiest selection criterion was to plant species that formerly grew on the site.

Stocking densities and planting strategies were recommended as ". . . four to the square rod, 640 to the acre, and among these and near them, should be other cheap and quick growing trees or shrubs to shade the ground and help keep out

grasses, herbaceous plants and weeds. For cheap nurse trees, to start quickly and shade the ground, there appears nothing better than box elder. On the light sand, jack pine started from seed is first rate."

Site preparation was acknowledged as being highly variable and dependent on prevailing conditions of vegetation cover and debris left from previous logging. Examples were presented for different scenarios. Protection of the young trees from grazing animals and fire was emphasized. The use of nurse trees to reduce weed and grass growth was suggested. If nurse trees exceeded the height of the stock trees, pruning was recommended. Beal recommended both clearcutting mature timber and selective harvesting of the maturing stand with the intent of encouraging natural regeneration. He strongly supported selective harvesting on slopes.

Regarding the planting of trees, Beal wrote "Evergreens are best planted just as the buds are pushing in the spring; other trees may be planted in the spring or fall, while they are destitute of leaves." Details were given to facilitate planting of the seedlings. Special care of bare root seedlings to prevent drying was stressed: "An experienced gardener knows that the roots of a young tree when exposed to dry air will live just about as long as a trout or a black bass in the same situation; the inexperienced or thoughtless person might lose most of his labor in tree planting by not knowing this fact." The planting of nuts was recommended in the spring and at a depth of two inches. Beal was aware of recalcitrant seeds and emphasized the need to plant the seeds of elm, birch, maple, and ash shortly after collection. Instruction on developing a tree nursery for seedling production was also presented (Beal 1899b).

After spending thirty years growing and experimenting with trees on and off the campus of M.A.C., Beal published a list of trees and shrubs planted on campus. The list, published in 1901, evaluated 619 taxa. Those he found to be hardy and 'otherwise desirable for planting' were marked with an asterisk (Beal 1901b). Referring to an original list of woody plants printed in 1887 by Professor L.H. Bailey, Beal commented that one thousand copies of Bailey's list were distributed over a period of ten years, and that this new updated list would replace the original. By today's standards, a thousand copies of a publication may appear small, but given the population of Michigan in the latter half of the 19th century, this figure represents a sizable interest in trees.

AN INFLUENCE ON PRESENT DAY FORESTRY

Dr. Beal realized the economic and social value of forests and the timber they produced. He worked to ensure that a future supply of forests and forest products would be available with a minimal impact on the environment through his efforts in reforestation and conservation. These actions clearly established the future direction of forestry and silviculture in the state of Michigan. Known as the "Father of Michigan Forestry", Dr. Beal pioneered methods of silviculture including site preparation; planting, transplanting and cultivation of forest trees; development of forest nurseries; evaluation testing for performance of both native and

introduced timber tree species under the variable climatic and soil conditions of Michigan; and tree seed storage and viability. His early suggestions as to the best trees to plant and where to plant them had an early impact on reforestation of Michigan, as did his advocacy toward forestry, conservation, and forest legislation. He was one of the founding directors of the original 1887 State Forestry Commission, and an advocate for the formation of, and participant in, the second State Forestry Commission. Today's Forest Management Division of the Michigan Department of Natural Resources can be traced back to the second State Forestry Commission. The 70,000 acres first reserved by the state in 1903 has grown to nearly 4 million acres of dedicated state forest land. Timber revenues from these lands now are sufficient to pay costs of management and part of the costs associated with fire control and wildlife management[8].

One of the most significant long-term contribution to the fields of silviculture and forestry is the importance of Beal's plantings to education and demonstration. All of his original forest tree plantings have survived, to some extent, into the present. The best preserved plantations, the Beal Pinetum and Arboretum, are on the MSU campus. These campus plantations continue to function as educational tools for thousands of students at Michigan State University in the fields of forestry and the plant sciences.

ACKNOWLEDGMENTS

The author wishes to acknowledge W. Botti, J. Grimes, B. Roulo, E. Chittenden, J. Kilgore, and A. Vaarar for assisting in the locating and documentation of historic plantations. In addition, the author is grateful for the assistance of D. Frye, S. Gould, and D. Hettinger, M.S.U. Archives and Historical Collections.

LITERATURE CITED

Anonymous. 1913. Notes copied from those taken by Dr. Beal at the dates indicated. William J. Beal Papers, Collection UA 17.4, Box 891, Folder 14, Michigan State University Archives and Historical Collections.

Beal, W.J. 1875a. Report of the Horticulture Department: Arborculture. 13th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1874. p. 51.

_____1875b. Report of the Horticulture Department: Nursery Rows. 12th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1873. p. 48-B.

_____1876. Report of the professor of botany and horticulture: Forestry and Nursery. 15th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1876. p. 110.

_____1878a. Report of the professor of botany and horticulture: Forestry and Nursery. 16th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1877. pp. 46–48.

_____1878b. Report of the professor of botany and horticulture: Arboretum and Nursery. 17th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1878. pp. 79–80.

_____1879a. Experiments and other work of the horticulture department, Notes of some timber trees

[8] Statistics and information regarding the Michigan Department of Natural Resources were supplied by Mr. William B. Botti, Timber Management Unit Leader, State Forest Operations Section, Forest Management Division, Michigan Department of Natural Resources.

in the arboretum. 18th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1879. pp. 188–191.

_____1879b. Experiments and other work of the horticulture department, Vitality of seeds. 18th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1879. pp. 191–192

_____1880. Experiments and other works of the Horticultural Department: Notes of some timber trees in the arboretum. 18th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1879. p. 188–191

_____1886. Lessons on growing forest trees. Agricultural College Bulletin No. 21. Botanical Department, 25th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1886. pp. 250–253

_____1887. Grasses of North America, Vol. I. H. Holt and Co., Publishers, New York. 671 pp.

_____1888a. The flora of the Jack-Pine plains of Michigan. Proceedings of the Society for Promotion of Agriculture 6:17–20.

_____1888b. Report of the Botanist: The experimentation station. 27th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1888. pp. 173–175.

_____1888c. Report of the Professor of Botany and Forestry: The Forestry Commission. 27th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1888. p. 45.

_____1889a. The Experimentation Station Report of the Botanist, Oscoda or Au Sable, 28th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1889. p 167.

_____1889b. Department of Botany and Forestry: Why not plant a grove? 28th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1889. pp. 218–222.

_____1891a. Report of the professor of botany and horticulture: Osier Willows. 30th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1890. p. 99.

_____1891b. Report of the professor of botany and horticulture: Arboretum. 30th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1890. p. 99.

_____1893a. Conditions of forestry as a business. The Engineering Magazine 5:82–89.

_____1893b. A forestry fortune: Our wealth of commercial woods. Miscellaneous Papers, 32nd Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1893. pp. 475–480.

_____1894. Report of the professor of botany and forestry: The Arboretum. 33rd Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1893. pp. 37–38.

_____1895. Some needs of forestry. 34th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1895. pp. 818–820.

_____1896. Grasses of North America, Vol. II. H. Holt and Co., Publishers, New York. 675 pp.

_____1899a. Department of Botany and Forestry: The Arboretum. 38th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1898. pp. 98–99.

_____1899b. Methods of reforesting pine stump lands. In: Forestry Bulletin, Bulletin 162, Smith, C.D. (editor), 38th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1899. pp. 129–134.

_____1900. Report of the department of botany and forestry: The Arboretum and the Woods of the College. 39th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1900. pp. 42–43.

_____1901a. Report of the professor of botany and forestry: The arboretum and the forest at the college. 40th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1901. pp. 43–44.

_____1901b. Report of the professor of botany and forestry: Trees and shrubs. 40th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1901. pp. 44–66.

_____1902. Report of the professor of botany and forestry: The arboretum and the forest at the college. 41st Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1902. p. 59.

_____1903. Some unsolved problems in Michigan forestry. Report of the Michigan Forestry Commission for the Year 1902. Robert Smith Printing Co., State Printers and Binders, Lansing, MI. pp. 76–79.

_____ 1905a. Two lessons in forestry. Report of the Michigan Forestry Commission for the Year 1903–4. Wynkoop Hallenbeck Crawfored Co., State Printers, Lansing, MI. pp. 63–65
_____ 1905b. Interest of scientists in forestry. Report of the Michigan Forestry Commission for the Year 1903–4. Wynkoop Hallenbeck Crawfored Co., State Printers, Lansing, MI. pp. 119–121.
_____ 1907. Report of the Department of Botany: The Arboretum. 46th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1907. p. 53.
_____ 1915. History of Michigan Agricultural College. Wynkoop Hallenbeck Crawford Co. Lansing. 519 pp.
_____ & C.W. Garfield (eds.) 1888. First Report of the Directors of the State Forestry Commission of Michigan for the Years 1887 and 1888. Thorp and Godfrey, State Printers and Binders, Lansing, MI, 92 pp.
Bogue, E.E. 1903. Report of Forestry Department. 42nd Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1903. pp. 42–46
Dressel, P.L. 1987. College to University: The Hannah Years at Michigan State 1935–1969. Michigan State University Press, East Lansing, MI. 442 pp.
Fernow, B.E. 1888. Proper basis of forestry legislation. In: Proceedings of the Forestry Convention. 27th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1888. pp. 354–359.
_____ 1902. Economics of Forestry, Thomas Y. Crowell & Co., NY. 392 pp.
Gardner, V.R. 1903. Notes on Arboretum. Unpublished paper in the Michigan State University Archives and Historical Collections, Madison Kuhn Collection UA17.107, Box 1141, Folder 40, 8 pp.
Garfield, C.W. 1905. Prefatory Notes. Report of the Michigan Forestry Commission for the years 1903–4. Wynkoop Hallenbeck Crawford Co., State Printers, Lansing, MI.
Griffiths, M. 1994. Index of Garden Plants. Timber Press, Portland, OR. 1234 pp.
Hannah, J.A. 1980. A Memoir. Michigan State University Press, East Lansing, MI. 143 pp.
Horstik, C.K. 1987. Michigan's Conservation Story: 'The Early Days'. Michigan Natural Resources Magazine 56(3):1–64.
Kuhn, M. 1955. Michigan State University; The First Hundred Years. Michigan State University Press, East Lansing, MI. 501 pp.
Reynolds, H.G. 1888. The Law Providing For A State Forestry Commission, Public Acts of Michigan, 1887.-Act No. 259. In: First Report of the Directors of the State Forestry Commission of Michigan for the Years 1887 and 1888. Thorp and Godfrey, State Printers and Binders, Lansing, MI, p. 1.
Smith, C.D. 1895. Report of the department of practical agriculture, and superintendent of the farm: Forestry. 34rd Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1895. p. 35.
_____ 1897. Report of the department of practical agriculture, and superintendent of the farm: Forestry. 36th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1896. pp. 32–33.
_____ 1898. Report of the agriculturist: Field experiments. 37th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1897. p. 90.
_____ed. 1899. Forestry Bulletin, Bulletin 162. 37th Annual Report of the Secretary of the Board of Agriculture of the State of Michigan for the year 1899. pp. 122–152.
Stoddard B. 1995. The World's Largest Nursery. Michigan Natural Resources Magazine. 65(5):10–14.
Voss, E. G. 1972. Michigan Flora: Part I. Gymnosperms and Monocots. Bull. Cranbrook Inst. Sci. 55 and Univ. Michigan Herbarium. 488 pp.
_____ 1985. Michigan Flora: Part II. Dicots (Saururaceae-Cornaceae). Bull. Cranbrook Inst. Sci. 59 and Univ. Michigan Herbarium. 724 pp.
_____ 1996. Michigan Flora: Part III. Dicots (Pyrolaceae-Compositae). Bull. Cranbrook Inst. Sci. 61 and Univ. Michigan Herbarium. 622 pp.

APPENDIX I

SPECIES LIST FOR THE ARBORETUM AT MICHIGAN STATE AGRICULTURAL COLLEGE 1873–1885

This list is a composite of data presented in Professor Beal's annual reports and the "Notes" by Gardner (1903). The species name in parentheses following a species is the synonym, invalid name or spelling used by Professor Beal in his original reports or notes. A question mark indicates an unknown species name. It is apparently not a comprehensive listing based on counts presented by Dr. Beal in his annual reports (approx. 144 taxa). The following references were used to verify nomenclature: Griffiths (1994), Voss (1972, 1985, 1996).

Abies sp.
Abies balsamea (L.) Mill.
Abies grandis (D. Don ex Lamb.) Lindl.
Abies nordminiana (Steven) Spach.
Acer campestre L.
Acer colchicum rubrum (?)
Acer negundo L. (*Negundo aceroides*)
Acer platanoides L.
Acer pseudoplatanus L.
Acer rubrum L.
Acer saccharinum L. (*A. dasycarpum* J.F. Ehrh.)
Acer saccharum L.
Acer spicatum Lam.
Acer tataricum L. (*A. tartatica*)
Aesculus glabra Willd.
Aesculus hippocastanum L.
Ailanthus altissima (Mill.) Swingle
Alnus sp.
Alnus glutinosa (L.) Gaertner
Alnus maritima (Marsh.) Nutt.
Amorpha fruticosa L.
Betula alleghaniensis Britt. (*Betula lutea*)
Betula lenta L.
Betula nigra L.
Betula nigra L. (*B. rubra* Michx.f.)
Betula papyrifera Marsh.
Betula pendula Roth (*B. alba* L.)
Betula pendula var. (?) (*B. alba* var. *castata*)
Betula populifolia Marsh.
Caragana pigmaea DC
Carpinus orientalis Mill. (*Carpinus duinensis* Scop.)
Carya aquatica (Michx.f.) Nutt.
Carya glabra (Mill.) Sweet (*Carya microcarpa* Nutt.)
Carya glabra (Mill.) Sweet (*Carya porcina* (Michx.f.) Nutt. mispelled as *C. percinea*?)
Carya laciniosa (Michx.f.) Loud. (*Hicoria laciniosa*)
Carya ovata (Mill.) C. Koch (*Carya alba* Nutt.)
Carya tomentosa (Poiret) Nutt.
Castanea pumila (L.) Mill.
Castanea dentata (Marsh.) Borkh. (*Castanea versca* var. *americana*)
Catalpa bignonioides Walt.
Catalpa ovata G. Don (*C. kempferi* Siebold & Zucc.)
Catalpa nana (?)
Catalpa speciosa (Warder) Engelm.
Catalpa hybrid (Teas Japan Hybrid)
Celtis sp.
Celtis occidentalis L.
Celtis occidentalis L. (*C. pumilla* Pursh)
Cercis canadensis L.
Clethra alnifolia L.
Cornus racemosa Lam. (*C. paniculata* L'Her.)
Cotoneaster sp.
Cydonia or *Chaenomeles* (not clear from notes)
Cytisus sp.
Cytisus scopanius (L.) Link (*C. laburnum*)
Diospyros virginiana L.
Fagus grandifolia J.F. Ehrh. (*F. americana* Sweet)
Fagus sylvatica L.
Fraxinus americana L.
Fraxinus nigra Marsh.
Fraxinus ornus L.
Fraxinus pennsylvanica Marsh. (*F. pubescens* Lam.)
Fraxinus pennsylvanica Marsh. (*F. viridis* Michx.f.)
Fraxinus quadrangulata Michx.
Gleditsia aquatica Marsh. (*G. monosperma* Walter)
Gordonia lasianthus (L.) Ellis.
Gymnocladus dioica (L.) K. Koch (*G. dicidious*)
Juglans cinerea L.
Juglans nigra L.
Juglans nigra L. × *Juglans cinerea* L. (?)
Juniperus virginiana L.
Larix decidua Mill. (*Larix europeae* DC.)
Ligustrum vulgare L.
Liriodendron tulipifera L.
Lonicera parriflora (?)
Maclura pomifera (Raf.) Schneid. (*Toxylon pomiferum*)
Magnolia acuminata L.

Magnolia acuminata var. *cordata* (Michx.) Sarg. (*M. cordata* Michx.)
Magnolia virginiana L.(*M. glauca* L.)
Malus coronaria (L.) Mill. (*Pyrus coronaria* L.)
Malus floribunda Siebold ex Van Houtte (*Pyrus floribunda* Siebold ex Kirch.)
Malus sylvestris Mill. (*Pyrus malus* L.)
Morus alba L.
Morus rubra L.
Nyssa sylvatica Marsh. (*N. multiflora* Wangenh.)
Philadelphus coronarius L. (*P. coronaria*)
Picea abies (L.) Karst. (*Picea excelsa* (Lam.) Link)
Picea glauca (Moench) Voss (*Picea alba* (Ait.) Link)
Pinus cembra L.
Pinus nigra Arnold
Pinus strobus L.
Pinus sylvestris L.
Platanus occidentalis L.
Platanus orientalis L.
Populus balsamifera L.
Populus deltoides Marsh.
Populus nigra L. (var. *dilatata*?)
Prinos verticillatus (?)
Prunus sp.
Prunus americana Marsh.
Prunus (cv. 'Basset'?)
Prunus persica (L.) Batsch. (Multiple varieties)
Prunus serotina J.F. Ehrh.
Prunus virginiana var. *demissa* (Nutt.) Sarg. (*Prunus demissa* (Nutt.) Walp.)
Ptelia trifoliata L.
Quercus alba L.
Quercus bicolor Willd.
Quercus cerris L.
Quercus coccinea Muenchh. (*Q. coccinea tinctoria*, could be *Q. velutina*?)
Quercus imbricaria Michx.
Quercus ilicifolia Wangenh. (*Q. nana*)
Quercus laevis Walt. (*Q. catesbaei* Michx.)
Quercus lyrata Walt.
Quercus macranthera Fisch. & C.A. Mey. (*Q. macrantha*)
Quercus macrocarpa Michx. (*Q. oliviformis* Michx.f.)
Quercus nigra L.
Quercus obtusifolia (?)
Quercus palustris Muenchh.
Quercus palustris compacta (?)
Quercus prinus L.
Quercus rubra L.
Quercus velutina Lam. (*Q. tinctoria* Bartr.)
Rhamnus lanceolata Pursh. (*R. lanceolatus*)
Rhododendron sp. (*Azalea* sp.)
Ribes sp. (Utah currants)
Robinia pseudoacacia L.
Salix alba L.
Salix humulis Marsh.
Salix nigra Marsh.
Spiraea sp.
Spiraea latifolia (Ait.) Borkh. (*S. carpinifolia* Willd.)
Spiraea media Schmidt. (*S. confusa* Reg. Körn.)
Staphylea trifolia L. (*S. trifoliata*)
Symphoricarpos orbiculatus Moench (*S. vulgaris* Michx.)
Tilia americana L.
Tilia americana var. *pubescens* (?)
Tilia × *europaea* L. (*T. europea*)
Tilia platyphyllos Scop.
Tsuga canadensis (L.) Carrière
Ulmus americana L.
Ulmus rubra Muhlenb. (*U. fulva* Michx.)
Ulmus latafolia (?)
Ulmus thomasii Sarg. (*U. racemosa* D. Thomas)
Ulmus pumila L. (*U. siberica*)
Vitis vulpina L. (*V. cordifolia* Michx.)

THE BIG TREES OF MICHIGAN
21. Castanea dentata (Marsh.) Borkh. American Chestnut

Elwood B. Ehrle
Dept. of Biological Sciences
Western Michigan University
Kalamazoo, MI 49008

The largest known American Chestnut in Michigan is located on the Old Mission Peninsula northeast of Traverse City (Grand Traverse County) in the northern part of Michigan's Lower Peninsula.

Description of the Species: The American Chestnut is a member of the Beech family (Fagaceae). In this family, members of the genus *Quercus* (Oaks) have acorns, while those of *Fagus* (Beech) and *Castanea* (Chestnut) have a bristly fruit. The Beech fruit divides into two sections at maturity while the fruit of a Chestnut divides into four. Furthermore, Beeches have male flowers in a round pendulous inflorescence, whereas the Chestnuts have male flowers in a more or less erect spike (Fig. 1). Finally, Beech buds are long and pointed, whereas Chestnut and Oak buds are shorter and more ovate.

The Chestnut was once a major component of hardwood forests in eastern North America, but was almost completely wiped out by the chestnut blight, a fungal parasite, in the first few decades of the twentieth century. The relatively few trees in northern Lower Michigan survived only by being well outside the main range of the species, which extended only into the southeasternmost part of the state.

Location of Michigan's Big Tree: Michigan's largest known American Chestnut is located northeast of Traverse City, Michigan. The tree can be found by taking US 31 in Traverse City north to the first traffic light past the Holiday Inn. Turn north on M37 (Center Rd.) and go about 14.4 miles north on the Old Mission Peninsula to Old Mission Rd. Turn right and go 0.7 miles to the curve, and then 0.4 miles to a yellow house at #18367. The tree is 0.2 miles west up a farm lane through a cherry orchard and stands near the top of a hill. This location is in Sec. 35, T30N R10W.

Description of Michigan's Big Tree: The tree has a solid healthy trunk. The first major branch is about 5′ above the ground and has a circumference of 64″ (163 cm). The circumference of the tree at breast height was measured on July 27, 1995 with John Spencer of Traverse City at 208″ (528 cm) [diameter = 66″ (168 cm)]. The crown spread was measured at 80′ (24 m), substantially less than the 106′ (32 m) previously recorded by John Thompson. The height was measured at 64′ (20 m), again substantially less than the 110′ (34 m) recorded by

FIGURE 1. Documented distribution in Michigan and characteristics of American Chestnut. Map is from Voss (1985). The star indicates the location of Michigan's Big Tree. Illustrations are from Barnes & Wagner (1991). 1. Winter twig, ×0.8; 2. Leaf, ×0.4; 3. Flowering shoots, ×0.4; 4. Male flower, enlarged; 5. Female flower, enlarged; 6. Prickly bur, opened, ×0.4; 7. Nut, ×0.4.

Thompson. Although height and crown size have decreased significantly, its State Champion status remains secure because State Champion trees are determined by the circumference of the trunk at breast height alone.

INVITATION TO PARTICIPATE

If you would like to join us in extending this series of articles by visiting and describing one or more of Michigan's Big Trees, please contact Elwood B. Ehrle

for help with locations, specifications for taking measurements and assistance with the manuscript. The Michigan Botanical Club encourages your involvement in this activity. Please remember to ask permission before entering private property.

DEDICATION

This series of articles is dedicated to the memory of Paul Thompson, Michigan's Big Tree Coordinator for over 40 years, who died in 1994.

LITERATURE CITED

Barnes, B. V., & W. H. Wagner, Jr. 1991. Michigan Trees. A Guide to the Trees of Michigan and the Great Lakes Region. Univ. of Michigan Press, Ann Arbor. viii + 383 pp.

Voss, E. G. 1985. Michigan Flora Part II. Dicots. (Saururaceae-Cornaceae). Bull. Cranbrook Inst. Sci. 59 and Univ. Michigan Herbarium. xix + 724 pp.

THE BIG TREES OF MICHIGAN
22. Fagus grandifolia Ehrh.
American Beech

Elwood B. Ehrle
Dept. of Biological Sciences
Western Michigan University
Kalamazoo, MI 49008

The largest known American Beech in Michigan is located in Onekema (Manistee County) of Michigan's Lower Peninsula.

Description of the Species: The American Beech is a member of the Beech family (Fagaceae). In this family, members of the genus *Quercus* (Oaks) have acorns, while those of *Fagus* (Beech) and *Castanea* (Chestnut) have a bristly fruit. The Beech fruit divides into two sections at maturity (Fig.1) while the fruit of a Chestnut divides into four. Furthermore, Beeches have male flowers in round, pendulous inflorescences whereas Chestnuts have male flowers in an elongated more or less erect spike and Oaks bear them in elongated hanging catkins. Finally, Beech buds are long and pointed whereas Chestnut and Oak buds are shorter and more ovate.

Location of Michigan's Big Tree: Michigan's largest known American Beech can be found in Onekema, Michigan. To find the tree take US 31 north from Manistee and turn left (west) into Onekema onto 8-mile Rd. Turn right at the stop sign and follow Main St. (M-22) through the town. Main St. becomes Portage Point Drive. Clark Rd. is just past the point at which M-22 leaves Portage Point Drive, about 1.5 mi. from the center of Onekema. Clark Rd. is unimproved. The tree is near the corner of Portage Point Drive and Clark Rd. on a densely wooded slope. The first house on the right is # 9017 Clark Rd., home of Mike Sebaly. The tree is approximately 250′ up the slope from Portage Point Drive, and 170′ from Clark Rd. The map coordinates for this location are Sec. 26, T23N R16W.

Description of Michigan's Big Tree: The tree has a solid trunk which divides into 2 main trunks about 5′ above the ground. The south trunk divides again into 3 large branches. The circumference of the tree at breast height was measured on July 26, 1995 at 193″ (490 cm) [Diameter = 61″ (156 cm)]. The crown spread was measured at 106′ (32 m). The height was measured at 98′ (30 m), substantially less than the 185′ (56 m) previously recorded by Paul Thompson, reflecting the loss of several large branches. Although height has decreased significantly, its State Champion status remains secure because State Champion trees are determined by the circumference of the trunk at breast height alone.

INVITATION TO PARTICIPATE

If you would like to join us in extending this series of articles by visiting and describing one or more of Michigan's Big Trees, please contact Elwood B. Ehrle for help with locations, specifications for taking measurements, and assistance with the

FIGURE 1. Documented distribution in Michigan and characteristics of the American Beech. Map is from Voss (1985). The star indicates the location of Michigan's Big Tree. Illustrations are from Barnes & Wagner (1991). 1. Winter twig. × 0.8; 2. Portion of twig, enlarged; 3. Leaf, ×0.8; 4. Flowering shoot, ×0.6; 5. Male flower, enlarged; 6. Female flower, enlarged; 7. Bur, opened, ×0.8; 8. Nut, ×0.8.

manuscript. The Michigan Botanical Club encourages your involvement in this activity. Please remember to ask permission before entering private property.

DEDICATION

This series of articles is dedicated to the memory of Paul Thompson, Michigan's Big Tree Coordinator for over 40 years, who died in 1994.

LITERATURE CITED

Barnes, B. V. & W. H. Wagner, Jr. 1991. Michigan Trees. A Guide to the Trees of Michigan and the Great Lakes Region. Univ. of Michigan Press, Ann Arbor. viii + 383 pp.

Voss, E. G. 1985. Michigan Flora. Part II. Dicots. (Saururaceae-Cornaceae). Bull. Cranbrook Inst. Sci. 59 and Univ. Michigan Herbarium. xix + 724 pp.

CONTENTS

On the cover: *Professor W.J. Beal in the Beal Pinetum, 1901. Compare with Figure 6 on page 47. (Photo from the Michigan State University Archives and Historical Collections)*

Vol. 37, No. 3

THE

MICHIGAN BOTANIST

May, 1998

THE MICHIGAN BOTANIST (ISSN 0026–203X) is published four times per year (January, March, May, and October) by the Michigan Botanical Club, c/o Herbarium, North University Building, The University of Michigan, Ann Arbor, MI 48109–1057. Second-class postage paid at Ann Arbor, MI. POSTMASTER: Send address changes to *THE MICHIGAN BOTANIST*, c/o Herbarium, North University Building, The University of Michigan, Ann Arbor, MI 48109–1057.

Subscriptions: See below. Single copies: $4.00.

Back issues are available except as noted below. Prices are: Vols. 1–13, $3.00 per vol. ($0.75 per no.); Vols. 14–18, $5.00 per vol. ($1.25 per no.); Vols. 19–21, $8.00 per vol. ($2.00 per no.); Vols. 22–31, $10.00 per vol. ($2.50 per no.); 32–present, $16.00 per vol. ($4.00 per no.).

The following issues are available only in complete sets or in sets beginning with Vol. 2 (marked as *): 1(1, 2 – all published), 2(1*, 4*), 4(3*), 5(1*, 2*, 3*), 7(4*), 9(3*), 19(3), and 26(3).

Institutional subscriptions and all orders for back issues should be addressed to the Business and Circulation Manager.

Address changes should be sent to the Business and Circulation Manager.

Articles dealing with any phase of botany relating to the Great Lakes Region may be sent to the Editor. In preparing manuscripts, authors are requested to follow our style and the suggestions in "Information for Authors" (Vol. 28, p. 43; Vol. 29, p. 143).

THE MICHIGAN BOTANICAL CLUB

Membership in the Michigan Botanical Club is open to anyone interested in its aims: conservation of all native plants; education of the public to appreciate and preserve plant life; sponsorship of research and publication on the plant life of the State; sponsorship of legislation to promote the preservation of Michigan native flora; establishment of suitable sanctuaries and natural areas; and cooperation in programs concerned with the wise use and conservation of all natural resources and scenic features.

Dues are modest, but vary slightly among the chapters and with different classes of membership. Persons desiring to become state members (not affiliated with a local chapter, for which contact persons are listed below), may send $17.00 dues to the Membership Chairperson listed below. In all cases, dues include a subscription to *THE MICHIGAN BOTANIST*. (Institutions desiring to subscribe should deal directly with the Business and Circulation Manager.) Foreign subscribers should remit in U.S. funds.

President: Elwood B. Ehrle, Biological Sciences Dept., Western Michigan University, Kalamazoo, MI 49008
Treasurer: David A. Steen, Biology Department, Andrews University, Berrien Springs, MI 49104-0410
Membership Chairperson: Alta Lahner, 6088 Old Log Trail, Kalamazoo, MI 49009
Huron Valley Chapter: Irene Eiseman, 1873 Pierce Road, Chelsea, MI 48118
Red Cedar Chapter: Hal Juran, P.O. Box 1395, East Lansing, MI 49104-0410
Southeastern Chapter: Margaret Converse, 34084 Dorais, Livonia, MI 48154
Southwestern Chapter: Sharon Heaney, 409 S. Cass, Berrien Springs, MI 49103
White Pine Chapter: Dorothy A. Sibley, 7951 Walnut, Newaygo, MI 49337

CHANGE OF ADDRESS NOTICE

EFFECTIVE IMMEDIATELY, THE MAILING ADDRESS FOR THE *MICHIGAN BOTANIST* HAS BEEN DIVIDED INTO THE TWO CATEGORIES LISTED BELOW. PLEASE DIRECT ANY CORRESPONDENCE TO THE APPROPRIATE ADDRESS:

For all matters related to **MANUSCRIPTS** and **PUBLICATION CONTENT,** please contact:

Dr. Neil A. Harriman – Editor
Michigan Botanist Editorial Office
Department of Biology
University of Wisconsin – Oshkosh
Oshkosh, WI 54901
e-mail: harriman@uwosh.edu

For all matters related to **BUSINESS AND CIRCULATION** (including **Address Changes, Back Issues, Billings,** and **Subscriptions**), please contact:

Mr. Tom Clough - Business Manager
Michigan Botanist Business Office
P.O. Box 85057
Westland, MI 48185
e-mail: tcloug@attglobal.net

VASCULAR FLORA AND PLANT COMMUNITY TYPES OF SEIDMAN PARK, KENT COUNTY, MICHIGAN

Pamela J. Laureto

Department of Biological Science
Grand Rapids Community College
Grand Rapids, MI 49503

ABSTRACT

A floristic study of Seidman Park, a 171-hectare (422 acre) tract in Kent County, Michigan was performed from April 1995 through November 1995. A total of 517 vascular plant species, infraspecific taxa, and hybrids were collected, representing 95 families and 282 genera. This total includes 24 new species records of occurrence for Kent County and 82 species that are not native to North America. Three species officially listed by the State as Endangered, Threatened, or Special Concern were identified. These include the American chestnut, *Castanea dentata*, which is listed as endangered, and the purple twayblade, *Liparis liliifolia*, and shellbark hickory, *Carya laciniosa*, which are both listed as special concern.

The plant communities of Seidman Park are described here and vegetation maps are included. The communities include upland forest (66.0% of total area), lowland forest (7.0%), swamp forest (7.0%), old field (16.0%), marsh (0.66%), blowout (0.4%), and fen (0.1%).

The history of the area and the pre-settlement vegetation are also described.

INTRODUCTION

Seidman Park is a 171-hectare (422 acre) tract of land along Honey Creek Avenue between 2 Mile Road and Conservation Street in Ada Township, Kent County, Michigan, approximately 3 km (2 mi.) northeast of Ada and 13 km (8 mi.) east of the City of Grand Rapids. The park was established in 1973 when L. William (Bill) and Sarah B. Seidman deeded several parcels of land to Kent County for the purpose of providing a natural site near a large metropolitan area (Seidman, pers. comm.). Several trails run through the park, making it accessible to walkers, joggers, and cross-country skiers. Seidman Park is often used as an outdoor classroom by local schools and as a field trip site for area naturalists. The plant communities within the park are diverse, ranging from fen and marsh to upland forest and hills of open sand. The diversity of habitats within 171 hectares (422 acres) makes Seidman Park an ideal site for a floristic study.

This study documents the vascular plant flora of Seidman Park and contributes to knowledge of the Kent County flora. The checklist of vascular plant species documented from the park will provide baseline data useful for informed management of the site.

Climate

In Grand Rapids, approximately 13 km (8 mi.) west of Seidman Park, the average annual precipitation is 92.4 cm (36.37 in.). Of this about 58% usually falls between April and September in the form of rain. The average seasonal snowfall is 193 cm (76.0 in.), and an average of 72 days a year have at least 2.54 centimeters (1 in.) of snow on the ground. The average daily maximum temperatures range from –1.8°C (28.8°F) in January to 28.8°C (82.8°F) in July. The lowest temperature on record is –31.1°C (–24°F) and the highest is 42.2°C (108°F); the growing season lasts for 181 days (Soil Conservation Service 1984).

Geology, Topography, Soils

Kent County lies in the west-central portion of the Lower Peninsula of Michigan. During the Wisconsinan glacial, the last of the four Pleistocene ice sheets covered the state. Within Kent County, deposits of glacial drift range from less than 10 feet (3 meters) to several hundred feet in thickness (Soil Conservation Service 1984). Glacial deposits in this part of the state are all Cary age end moraines which date from approximately 16,000 years to about 13,500 years before the present (Dorr & Eschman 1970). This glacial drift forms the parent material for many of the county's soils and creates the undulating plain of the county's landscape.

Soil composition is a primary factor influencing vegetational composition (Hausenbuiller 1978). Seidman Park is located in the Chelsea-Plainfield-Boyer soil association. This association is characterized by gently rolling to very steep inclines and excessively drained to well drained sandy soils (Soil Conservation Service 1984).

History of the Area

The mound-building Hopewell Indians inhabited the area now known as Ada Township from 300 BC to 300 AD. Their mounds have been found about 6.5 km (4 mi.) southeast of Seidman Park at the mouth of the Flat River near Lowell, and about 13 km (8 mi.) west on the bank of the Grand River in Grand Rapids. The Hopewells left when the Ottawa Indians moved to the area (Kent Co. Library Staff 1975).

In 1821, Rix Robinson, a representative of the American Fur Company, established a trading post along the river where the town of Ada now stands. Robinson was the first permanent settler of Kent County and became the liaison between European settlers and the Ottawa Indians (Dillenback & Leavitt 1870). In 1836, Robinson traveled with six Indian chiefs to Washington where the chiefs agreed to the "Washington Treaty," thereby ceding their lands to the U.S. Government (Siegel 1993).

The Ordinance of 1785 established the land survey system that provided the framework on which to record land ownership (Stearns 1974). Seidman Park (W1/2 Sec. 14, NW1/4 Sec. 23, T7N R10W) was surveyed on the 5th day of April, 1837, by Ch. W. Cathcast, Deputy Surveyor, John P. Cathcast and Hiram

Dickenson, Chainmen, and Henry Scott, Marker. Surveyor's notes were used to reconstruct the pre-settlement vegetation of Seidman Park. The reconstruction indicated that the dominant trees were white oak (*Quercus alba*) and black oak (*Quercus velutina*). Ashes (*Fraxinus* spp.) and hickories (*Carya* spp.) were present in sufficient numbers to be mentioned (Land Survey Notes 1837). In 1870, Dillenback & Leavitt described the land surrounding the town of Ada as "oak openings" with rolling hills and "rather sandy" soil.

Shortly after the signing of the "Washington Treaty" and the subsequent subdividing of the land into townships and sections, settlers began to move into Ada Township. Settlers bought land from the U.S. Government by "entering" and paying for their land of choice at a Land Office. The buyer would receive a receipt for his money and, some time later, a "patent" from Washington, D.C. signed with the President's name (Kent Co. Library Staff 1975).

Horace H. Ward was the first to buy a portion of the land now occupied by Seidman Park. His patent was dated August 20, 1839, and was for the 16.2 hectares (40 acres) described as the SW1/4 of the NW1/4 of Sec. 23. In 1846 H. H. Ward received a second patent for 16.2 hectares (40 acres) described as the NW1/4 of the NW1/4 of Sec. 23. Mr. Ward's chief use of the land was for sheep pastures.

In 1843 Michael Farrall of Westmeath, Ireland received a patent for the NW1/4 of Sec. 14. Mr. Farrall was an engineer with the Michigan Central Railroad and eventually bought thousands of acres in Ada and its surrounding townships. Dr. John O. Smith, one of Kent County's first physicians, purchased the remainder of the current park land between 1844 and 1846. Dr. Smith purchased the SW1/4 of Sec. 14 and the E1/2 of the NW1/4 of Sec. 23. He farmed the land and practiced medicine among the white settlers and Indians (Chapman 1881, Siegel 1993).

In 1867, the Ada Schoolhouse No. 4 was erected on Conservation Street about 1/4 mile east of Honey Creek Rd. in section 23 (Dillenback & Leavitt 1870). The school was a typical one-room country school with one teacher and eight grades (Siegel 1993). Its foundation is still visible today just west of the Conservation Street parking lot.

Records of Ada Township property owners indicate that the land changed hands several times and that its use was primarily agricultural. Old horse-drawn farm equipment remains buried in a shrub thicket today as witness to the land's former use.

In 1955, Bill Seidman purchased the NW1/4 of Section 23 and, in 1967, the W1/2 of Section 14 except for 4 hectares (10 acres) along Honey Creek Road. Mr. Seidman left his property undisturbed, except for removal of the old schoolhouse and the digging of a small pond in the southwest corner (Seidman, pers. comm.). The property was deeded to Kent County and in 1979 was named Seidman Park in recognition of its donor.

PLANT COMMUNITIES

A map of Seidman Park was drawn from a 1955 aerial photograph to show the major plant communities present at the time when Mr. Seidman purchased the NW1/4 of Sec. 23 (Figure 1). At that time 44% of the land was old field and 5.5% was agricultural field. The combined swamp, lowland, and upland forests accounted for 36% of the land with the remainder being a combination of water bodies, marshes, blowouts, pine plantations, and fen.

The current plant community types, overlain with the Seidman Park trails, were drawn from a 1994 aerial photograph and 1995 field observations (Figure 2). Changes, most likely due to succession, can be seen by comparing Figures 1 and 2. Marsh occurs in the central west area, in the southwest corner, and at the edges of the larger woodland ponds, accounting for approximately 0.66% of the total area. There are several areas of swamp forest (7.0% total) and lowland forest (7.0%). Also, there are three blowouts (0.4%), three small pine plantations (1.0%), and a fen (0.1%). The remainder of the park is a mosaic of upland forest (66.0%) and old fields (16.0%).

Honey Creek flows through the south end of Seidman Park, from the east border about halfway across the park to the west, exiting the park along the southern border. Several small creeks run through the park and empty into Honey Creek. Swamp forest and lowland forest shoulder these creeks. Two small unnamed bodies of water and several ephemeral woodland ponds are also scattered throughout the park. Many of these are bordered by marsh. Human intervention and succession have played a major role in the current community structure at Seidman Park. Where farmland was once cleared, there is now old field and second-growth forest. An artificial pond in the southwest corner of the property and pine plantations also attest to human intervention.

Marshes are wetlands dominated by graminoids that are rooted in or emergent from soil that is flooded all or most of the year (Brewer 1994; Crum 1991). The marshes at Seidman Park are defined by their dominant plant, *Typha latifolia*. Other herbs common in the marshes include *Asclepias incarnata*, *Bidens cernua*, *Carex hystericina*, *C. lanuginosa*, *Cladium mariscoides*, *Cyperus strigosus*, *Eleocharis erythropoda*, *Equisetum arvense*, *Eupatorium maculatum*, *Scirpus atrovirens*, *S. cyperinus*, *S. pendulus*, *S. validus*, and *Thelypteris palustris*.

Fens are wetlands that are under the influence of mineral-rich ground water that is at or near the surface. The vegetation is dominated by grasses and sedges, but a shrub cover is sometimes present (Brewer 1994; Crum 1991). Common herbaceous plants in the fen are *Carex stricta*, *C. leptalea*, *Lysimachia quadriflora*, *Rudbeckia fulgida*, *Selaginella eclipes*, *Solidago riddellii*, and *Viola cucullata*. The dominant shrub is *Potentilla fruticosa*; *Hypericum prolificum* is also present. *Cornus foemina*, *Salix discolor*, and *S. petiolaris* grow at the edge of the fen.

A swamp is a forested wetland. The floor of the swamp is a series of depressions and rises created by logs and upturned roots of fallen trees. Ferns, vines, and shrubs grow on the rises; mosses and liverworts cover the logs and tree bases. Pools of water often remain in the depressions, and the soil is a rich

deep muck that is saturated most of the year (Brewer 1994; Crum 1991). *Fraxinus nigra*, *F. pennsylvanica*, *Larix laricina*, and *Tilia americana* form the overstory. Common shrubs of the swamp forest are *Alnus rugosa*, *Cornus stolonifera*, *Corylus americana*, *Ribes triste*, *Rosa palustris*, *Sambucus canadensis*, *Spiraea alba*, *Toxicodendron vernix,* and *Vaccinium corymbosum*. *Caltha palustris*, *Carex stricta*, *Cirsium muticum*, *Cypripedium reginae*, *Osmunda cinnamomea*, *O. claytoniana*, *O. regalis*, *Oxypolis rigidior*, *Habenaria psycodes*, *Rudbeckia laciniata*, *Saxifraga pensylvanica*, *Solidago patula*, *Symplocarpus foetidus*, and *Thalictrum dasycarpum* are present in the swamp forest herbaceous layer.

Lowland woods are typified by low topography and moist loamy soil. The soil is often saturated in early spring but dries as the season progresses. *Fraxinus pennsylvanica*, *Tilia americana,* and *Ulmus rubra* form the overstory. *Carpinus caroliniana* dominates the understory. The shrub layer is characterized by *Cornus foemina*, *Hamamelis virginiana*, *Physocarpus opulifolius*, *Ribes cynosbati*, *Viburnum lentago*, and *V. opulus*. Common herbs in the lowland woods are *Actaea rubra*, *Anemonella thalictroides*, *Arisaema triphyllum*, *Cardamine douglassii*, *Eupatorium rugosum*, *Geranium maculatum*, *Phlox divaricata*, *Ranunculus hispidus*, *R. abortivus*, *Solidago caesia*, and *Trillium grandiflorum*.

The upland forest is characterized by gently rolling hills and sandy, well-drained soil. *Quercus alba* and *Quercus velutina* form the dominant overstory vegetation in the upland forest community. *Carya cordiformis*, *C. ovata*, *Fraxinus americana*, and *Quercus rubra* are also present in the overstory. Young *Acer rubrum*, *Cornus florida*, and *Ostrya virginiana* characterize the understory. The herbaceous layer is represented by several species each of *Botrychium*, *Lycopodium*, and *Galium*. *Asplenium platyneuron*, *Carex pensylvanica*, *Hystrix patula*, *Goodyera pubescens*, *Maianthemum canadense*, and *Monotropa uniflora* are also common in the herb layer.

Old fields are abandoned agricultural fields that are in various stages of succession. *Pinus banksiana*, *Crataegus* spp., *Populus grandidentata*, *Populus tremuloides*, *Prunus americana*, *Sassifras albidum*, and *Juniperus virginiana* are common trees in the old field. Old field shrubs include *Amelanchier* spp., *Elaeagnus umbellata*, *Lonicera* spp., *Rubus flagellaris*, and *Rubus occidentalis*. Common herbs are *Achillea millefolium*, *Andropogon virginicus*, *Artemisia campestris*, *Centaurea maculosa*, *Chrysanthemum leucanthemum*, *Dactylis glomerata*, *Erigeron strigosus*, *Euphorbia corollata*, *Hieracium caespitosum*, *Lespedeza capitata*, *L. hirta*, *Monarda fistulosa*, *M. punctata*, and *Rudbeckia hirta*. Several species each of *Aster*, *Carex*, *Desmodium*, *Panicum*, *Poa*, and *Solidago* are also present.

A blowout is a shallow depression from which all or most of the soil material has been removed by wind (Soil Conservation Service 1984). Rocks and pebbles are scattered throughout the sand substrate. Mosses and lichens cover the sand at the edge of the blowout, providing substrate stability for young *Quercus velutina*. *Helianthemum canadense* flourishes at the edges of the blowouts.

Ruderal habitats occur at the edges of parking lots, their adjacent picnic areas, and to some extent along the trails and roads bordering the park. Plants that grow in these areas are often considered weeds. Common plants of the ruderal habitat

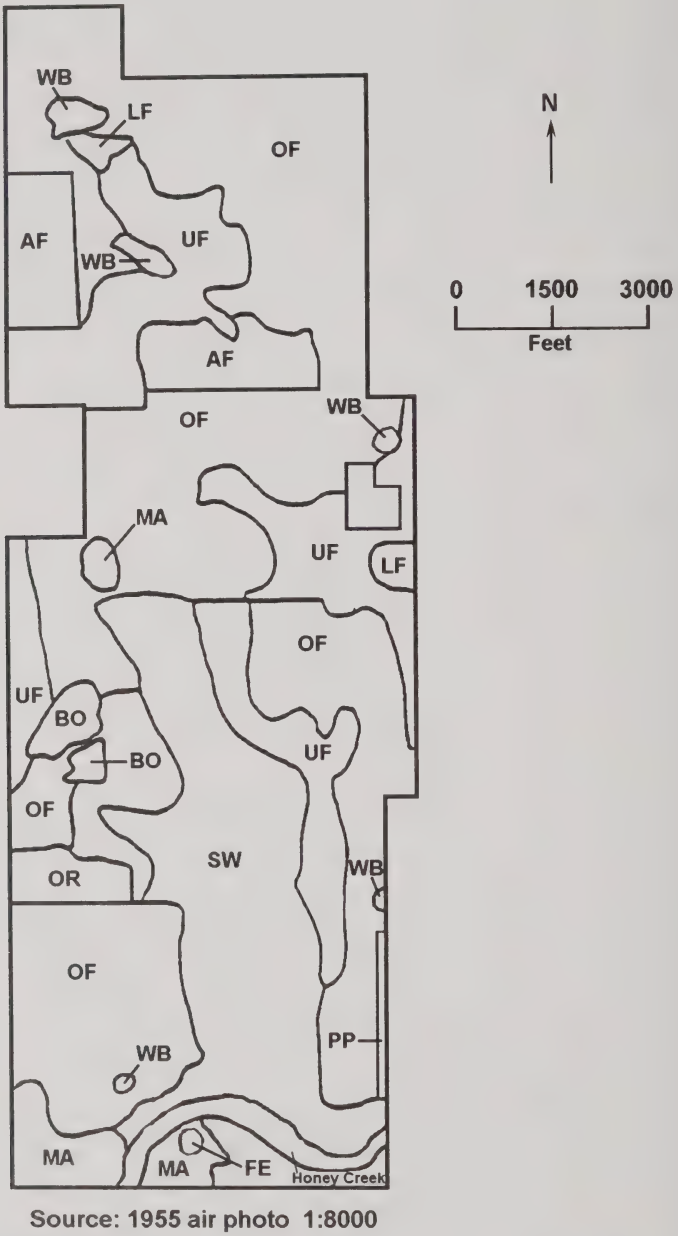

FIGURE 1. Seidman Park vegetation map for 1955. AF=agricultural, BO=Blowout, FE=Fen, LF=Lowland Forest, MA=Marsh, OF=Old Field, OR=Orchard, PP=Pine Plantation, SW=Swamp, UF=Upland Forest, WB=Water Body.

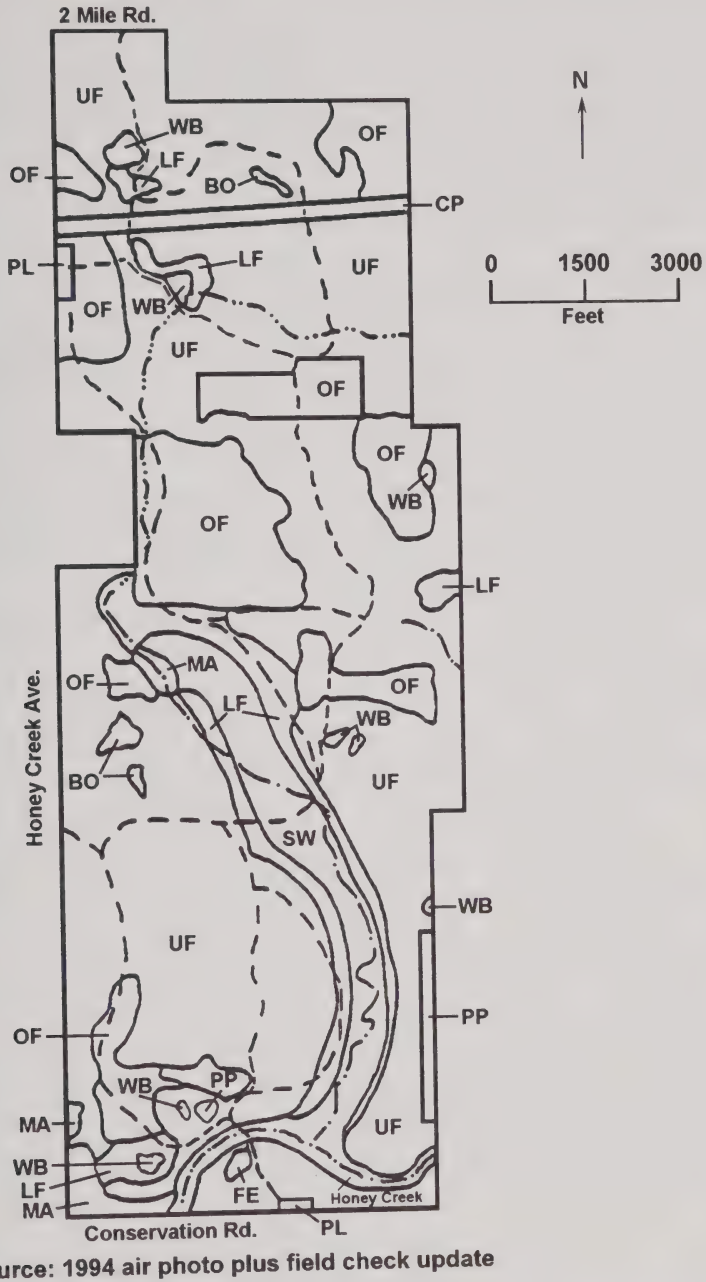

FIGURE 2. Seidman Park vegetation map for 1995. BO=Blowout, CP=Consumers Power Co. Right-of-Way, FE=Fen, LF=Lowland Forest, MA=Marsh, OF=Old Field, PL=Parking Lot, PP=Pine Plantation, SW=Swamp, UF=Upland Forest, WB=Water Body, -·- Permanent Streams, -·-·- Intermittent Streams, - - - - Trails.

include *Asclepias syriaca*, *Alliaria petiolata*[1], *Barbarea vulgaris*, *Carex digitalis*, *Cerastium vulgatum*, *Cichorium intybus*, *Cirsium arvense*, *C. vulgare*, *Daucus carota*, *Erigeron annuus*, *Hypericum perforatum*, *Lepidium campestre*, *Medicago lupulina*, *Melilotus alba*, *Phleum pretense*, *Rhus glabra*, *Rumex crispus*, *Stellaria media*, *Taraxacum officinale*, *Verbascum blattaria*, *V. thapsus*, *Vitis aestivalis*, and *V. riparia*.

Plant Collecting and Identification

Plant collections were made from April 1995 to November 1995 and prepared according to standard field and herbarium techniques (Woodland 1991; MacFarlane 1985). An attempt was made to document all vascular plants that occur in the park, and representative vouchers were deposited in the Hanes Herbarium, Western Michigan University (WMU).

Primary references used for identification of specimens include Ballard (1994), Barnes and Wagner (1981), Britton and Brown (1914a–c), Gleason and Cronquist (1991), and Voss (1972, 1985, 1996). Origins of introduced species were determined according to Voss (1972, 1985, 1996). Those species listed as Endangered, Threatened, or Special Concern were determined from *Michigan's Special Plants* (MI DNR & MNFI 1992).

Five hundred seventeen vascular plant species, infraspecific taxa and hybrids were collected from Seidman Park, belonging to 95 families and 282 genera. Seedless vascular plants constitute 5.6% of the flora (29 species), conifers 1.4% (7), monocots 21.7% (112) and dicots 71.4% (369). The largest families are the Asteraceae (61 species), Poaceae (35 species), Cyperaceae (34 species), and Fabaceae (23 species). Eighty-two non-native species were present, representing 15.9 percent of the total flora. Twenty-four new species records of occurrence for Kent County resulted from this study.

Despite the large number of species identified from the research area, only a few are sufficiently rare to evoke concern for their conservation. American chestnut, *Castanea dentata* (Marsh.) Borkh., is state listed as endangered, a designation which, according to the Endangered Species Act of the State of Michigan (Public Act 203 of 1974), indicates the species is in danger of extinction throughout all or a significant part of its range (MI DNR & MNFI 1992). The American chestnut is in danger of extinction owing to the introduced chestnut blight fungus, *Cryphonectria parasitica*. Shellbark hickory, *Carya laciniosa* (Michx. f.) G. Don, and purple twayblade, *Liparis liliifolia* (L.) Lindley, are listed as plants of special concern. These are not protected under the state's Endangered Species Act but are of special concern owing to their declining populations.

[1] This invasive exotic appeared in 1997 along the trails in the south end of the park where it now appears to be well established.

ANNOTATED LIST OF VASCULAR PLANTS

The annotated checklist of vascular plants was prepared following Palmer, Wade and Neal (1995). The checklist of vascular plants is arranged synoptically according to Voss (1972, 1985, 1996), and the sequence of taxa within families is alphabetical. Whenever possible, taxa are delineated to the varietal level.

Nomenclature and taxonomy generally follows *Flora of North America* (Flora of North America Editorial Committee 1993) for pteridophytes, and Voss (1972, 1985, 1996) for gymnosperms and angiosperms with the following exception: species of *Viola* follow Ballard (1994). In an effort to make the checklist more useful to the general public, vernacular names are given whenever possible, primarily following Voss (1972, 1985, 1996).

Based on field observations, the following categories of relative abundance were assigned to each collection: R = rare, I = infrequent, L = local, O = occasional, C = common, A = abundant (see Table 1 for definitions of abundance categories).

A vernacular name, the habitat in which the plant was found, an indication of relative abundance, and a collection number follow each binomial and author. Non-native species are indicated in bold and their place of origin is indicated following the collection number. An asterisk (*) indicates a species not recorded for Kent County in Voss (1972, 1985, 1996).

TABLE 1: Relative Abundance Categories Defined.

R — rare	Difficult to find and limited to one or a very few locations
I — infrequent	Difficult to find, with only a few individuals at any one location, but present in several locations
L — local	Found only in one location but many individuals are present
O — occasional	Widely scattered but not difficult to find
C — common	Easily found in one or more common habitats, but not dominant in any common habitat
A — abundant	Dominant in one or more common habitats

PTERIDOPHYTES

LYCOPODIACEAE (Club-moss Family)

Diphasiastrum complanatum (L.) Holub; Northern Running-pine. Upland woods; O; *1086.*
Diphasiastrum digitatum (Dillen.) Holub; Southern Running-pine. Upland woods; L; *1070.*
Huperzia lucidula (Michx.) Trevisan; Shining Fir-moss. Upland woods; I; *518.*
Lycopodium clavatum L.; Common Club-moss. Upland woods; I; *480.*
Lycopodium obscurum L.; Flat-branched Tree Club-moss. Upland woods; O; *481.*

SELAGINELLACEAE (Spike-moss Family)

Selaginella eclipes W. R. Buck; Buck's Meadow Spike-moss. Fen; L; *630.*

EQUISETACEAE (Horsetail Family)

Equisetum arvense L.; Common Horsetail. Wet edge of marsh; C; *476.*
Equisetum hyemale L.; Common Scouring Rush. Bank of Honey Creek; I; *660.*
Equisetum laevigatum A. Braun; Smooth Scouring Rush. Lowland woods; I; *640.*
Equisetum pratense Ehrh.; Meadow Horsetail. Swamp woods; L; *608.*

OPHIOGLOSSACEAE (Adder's-tongue Family)

Botrychium dissectum Spreng.; Dissected Grapefern. Upland woods; O; *989*.
Botrychium multifidum (S.G. Gmelin) Rupr.; Leather Grapefern. Upland woods; I; *919*.
Botrychium oneidense (Gilbert) House; Blunt-lobed Grapefern. Upland woods; I; *983*.
Botrychium virginianum (L.) Sw.; Rattlesnake Fern. Moist woods; O; *693*.

OSMUNDACEAE (Royal Fern Family)

Osmunda cinnamomea L.; Cinnamon Fern. Swamp woods; C; *692*.
Osmunda claytoniana L.; Interrupted Fern. Lowland woods; I; *734*.
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray; Royal Fern. Bank of woodland pond; O; *764*.

PTERIDACEAE (Maidenhair Fern Family)

Adiantum pedatum L.; Northern Maidenhair. Swamp woods; C; *705*.

DENNSTAEDTIACEAE (Bracken Family)

Pteridium aquilinum (L.) Kuhn var. *latiusculum* (Desvaux) L. Underwood ex A. Heller; Eastern Bracken Fern. Upland woods; O; *612*.

THELYPTERIDACEAE (Marsh Fern Family)

Thelypteris palustris Schott var. *pubescens* (Lawson) Fern.; Marsh Fern. Swamp woods; C; *1073*.

ASPLENIACEAE (Spleenwort Family)

Asplenium platyneuron (L.) BSP; Ebony Spleenwort. Upland woods; O; *707*.

DRYOPTERIDACEAE (Wood Fern Family)

Athyrium filix-femina (L.) Mertens var. *angustum* (Willdenow) G. Lawson; Northern Lady Fern. Lowland woods; C; *825*.
Dryopteris campyloptera (Kunze) Clarkson; Eastern Spreading Wood-fern. Lowland woods; O; *1025*.
Dryopteris carthusiana (Villars) H. P. Fuchs.; Toothed Wood-fern. Lowland woods; O; *1026*.
Dryopteris cristata (L.) A. Gray; Crested Wood-fern. Swamp woods; O; *1017*.
Dryopteris intermedia (Muhl. ex Willd.) A. Gray; Evergreen Wood Fern. Lowland woods; O; *1051*.
Onoclea sensibilis L.; Sensitive Fern. Bank of Honey Creek; A; *796*.
Polystichum acrostichoides (Michx.) Schott; Christmas Fern. Swamp woods; C; *706*.

GYMNOSPERMS

PINACEAE (Pine Family)

Larix laricina (Duroi) K. Koch; Tamarack. Swamp woods; L; *560*.
***Picea abies* (L.) Karsten**; Norway Spruce. Upland woods; R; *491*; Europe.
Pinus banksiana Lamb.; Jack Pine. Old field; O; *767*.*
Pinus resinosa Aiton; Red Pine. Old field; I; *758*.
Pinus strobus L.; White Pine. Upland woods; O; *474*.
***Pinus sylvestris* L.**; Scots Pine. Old field; C; *492*; Europe.

CUPRESSACEAE (Cypress Family)

Juniperus virginiana L.; Red-cedar. Old field; O; *493*.

MONOCOTS

TYPHACEAE (Cat-tail Family)

Typha latifolia L.; Common Cat-tail. Marsh; A; *834*.

SPARGANIACEAE (Bur-reed Family)

Sparganium eurycarpum Engelm.; Giant Bur-reed. Marsh; L; *713*.

POTAMOGETONACEAE (Pondweed Family)
Potamogeton foliosus Raf. Woodland pond; R; *959*.

ALISMATACEAE (Water-plantain Family)
Alisma triviale Pursh; Water-plantain. Wet edge of woodland pond; O; *931*.
Sagittaria latifolia Willd.; Duck-potato. Wet edge of woodland pond; O; *930*.

POACEAE (Grass Family)
***Agropyron repens* (L.) Beauv.;** Quack-grass. Edge of parking lot; C; *870*; Eurasia.
***Agrostis gigantea* Roth**; Redtop. Old field; C; *938*; Europe.
Agrostis hyemalis (Walter) BSP.; Ticklegrass. O; Old field; *865*.
Agrostis perennans (Walter) Tuckerman; Autumn Bentgrass. Upland woods; C; *1000*.
Andropogon scoparius Michx.; Little Bluestem. Old field; L; *1013*.
Andropogon virginicus L.; Broom-sedge. Old field; C; *1003*.*
Brachyelytrum erectum (Roth) P. Beauv. Lowland woods; O; *940*.
***Bromus inermis* Leysser**; Smooth Brome. Old field; A; *807*; Europe.
Bromus pubescens Willd.; Canada Brome. Lowland woods; O; *881*.
Cinna arundinacea L.; Wood Reedgrass. Swamp woods; C; *558*.
***Dactylis glomerata* L.;** Orchard Grass. Old Field; A; *699*; Eurasia.
Danthonia spicata (L.) R. & S.; Poverty Grass. Right-of-way clearing; C; *864*.
Digitaria ischaemum (Schreber) Muhl.; Crab Grass. In trail; I; *1035*.
Elymus canadensis L.; Canada Wild-rye. Fen; C; *950*.
Elymus villosus Willd.; Downy Wild-rye. Swamp woods; A; *863*.
Eragrostis spectabilis (Pursh) Steudel; Tumble Grass. Old field; C; *970*.
Festuca obtusa Biehler; Nodding Fescue. Upland woods; O; *832*.
Festuca octoflora Walter; Six-weeks Fescue. Old field; L; *675*.
Glyceria striata (Lam.) A. Hitchc.; Fowl Manna Grass. Floodplain; I; *775*.
Hystrix patula Moench; Bottlebrush Grass. Upland woods; C; *831*.
Leersia oryzoides (L.) Sw.; Cut Grass. Edge of woodland pond; I; *1050*.
Leersia virginica Willd.; White Grass. Edge of trail; C; *952*.
Leptoloma cognatum (Schultes) Chase. Old field; C; *960*.
Milium effusum L. Lowland woods; C; *686*.
Muhlenbergia schreberi J. F. Gmelin; Nimblewill. Lowland woods; I; *1062*.
Panicum columbianum Scribner. Open upland woods; C; *751*.
Panicum commonsianum Ashe. Upland woods; C; *730*.
Panicum depauperatum Muhl. Old field; O; *678*.
Panicum implicatum Britton. Upland woods; O; *926*.
Panicum latifolium L. Upland woods; I; *944*.
Panicum oligosanthes Schultes. Right-of-way clearing; O; *850*.
***Phleum pratense* L.;** Timothy. Right-of-way clearing; A; *784*; Europe.
Poa alsodes A. Gray. Moist woods; O; *553*.
***Poa compressa* L.**; Canada Bluegrass. Old field; C; *740*; Europe.
Poa pratensis L.; Kentucky Bluegrass. Upland woods; C; *731*.

CYPERACEAE (Sedge Family)
Carex blanda Dewey. Woods; C; *639*.
Carex bromoides Willd. Bank of Honey Creek; O; *540*.
Carex cephalophora Willd. Woods; C; *687*.
Carex crinita Lam. Bank of woodland pond; O; *749*.
Carex foenea Willd. Upland woods; O; *581*.
Carex gracilescens Steudel. Edge of trail; C; *623*.
Carex gracillima Schw. Moist woods; C; *582*.
Carex granularis Willd. Wet spot in old field; O; *554*.
Carex hystericina Willd. Marsh; O; *737*.
Carex interior Bailey. Seepy ground; C; *676*.
Carex lanuginosa Michx. Marsh; C; *739*.
Carex leptalea Wahl.. Fen; C; *634*.
Carex lupulina Willd. Bank of woodland pond; O; *747*.
Carex muhlenbergii Willd. Old field; C; *652*.

Carex pedunculata Willd. Upland woods; C; *541.*
Carex pensylvanica Lam. Upland woods; A; *555.*
Carex retroflexa Willd. Sandy soil in upland woods; R; *624.**
Carex rosea Willd. Woods; C; *653.*
Carex stipata Willd. Moist woods; O; *552.*
Carex stricta Lam. Marsh; C; *556.*
Carex swanii (Fern.) Mack. Woods; C; *771.*
Carex tribuloides Wahl. Wet bank of woodland pond; O; *773.*
Carex tuckermanii Dewey. Bank of woodland pond; O; *748.*
Cladium mariscoides (Muhl.) Torr.; Twig-rush. Marsh; O; *991.*
Cyperus filiculmis Vahl. Old field; O; *939.*
Cyperus strigosus L. Marsh. O; *961.*
Dulichium arundinaceum (L.) Britton; Three-way Sedge. Wet edge of woodland pond; O; *932.*
Eleocharis erythropoda Steudel. Marsh; O; *735.*
Eleocharis smallii Britton. Edge of woodland pond; O; *750.*
Eleocharis obtusa (Willd.) Schultes. Marsh; O; *736.*
Scirpus atrovirens Willd. Marsh; A; *827.*
Scirpus cyperinus (L.) Kunth; Wool-grass. Marsh; C; *971.*
Scirpus pendulus Muhl. Marsh; C; *738.*
Scirpus validus Vahl.; Softstem Bulrush. Marsh; O; *733.*

ARACEAE (Arum Family)
Arisaema triphyllum (L.) Schott var. *triphyllum*; Jack-in-the-pulpit. Moist woods; C; *538.*
Symplocarpus foetidus (L.) Nutt.; Skunk-cabbage. Bank of Honey Creek; A; *469.*

LEMNACEAE (Duckweed Family)
Lemna minor L.; Duckweed. Woodland pond; A; *482.*

COMMELINACEAE (Spiderwort Family)
Tradescantia ohiensis Raf. Edge of trail; O; *702.*

JUNCACEAE (Rush Family)
Juncus effusus L.; Soft Rush. Bank of woodland pond; O; *694.*
Juncus tenuis Willd.; Path Rush. On trail through old field; O; *805.*
Luzula multiflora (Retz.) Lej.; Wood Rush. Edge of trail; C; *535.*

LILIACEAE (Lily Family)
Allium canadense L. var. *canadense*; Wild Garlic. Swamp woods; O; *777.*
Allium tricoccum Aiton var. *tricoccum*; Wild Leek. Moist woods; O; *539.*
***Allium vineale* L.**; Field Garlic. Edge of trail; I; *546*; Europe.
***Asparagus officinalis* L.**; Garden Asparagus. Old field; I; *887*; Old World.
Erythronium americanum Ker; Trout-lily. Bank of Honey Creek; C; *470.*
Hemerocallis fulva (L.) L.; Orange Day-lily. Edge of parking lot; C; *875.**
Lilium michiganense Farw.; Michigan Lily. Lowland woods; O; *847.*
Maianthemum canadense Desf. var. *canadense*; Wild Lily-of-the-valley. Upland woods; A; *614.*
Medeola virginiana L.; Indian Cucumber-root. Moist woods; R; *710.*
***Muscari botryoides* (L.) Miller**; Grape-hyacinth. Upland woods; R; *577*; Europe.
Polygonatum biflorum (Walter) Ell.; Solomon-seal. Edge of parking lot; R; *874.*
Polygonatum pubescens (Willd.) Pursh; Solomon-seal. Woods; C; *615.*
Smilacina racemosa (L.) Desf.; False Solomon-seal. Woods; C; *719.*
Smilacina stellata (L.) Desf.; False Solomon-seal. Moist woods; O; *585.*
Smilax tamnoides L. var. *hispida* (Torrey) Fern.; Bristly Greenbrier. Upland woods; O; *901.*
Trillium grandiflorum (Michx.) Salisb.; Common Trillium. Moist woods; C; *527.*

DIOSCOREACEAE (Yam Family)
Dioscorea villosa L.; Wild Yam. Upland woods; O; *800.*

IRIDACEAE (Iris Family)
***Iris pseudacorus* L.**; Yellow Flag. Bank of Honey Creek; R; *794*; Europe.

Iris virginica L.; Southern Blue Flag. Edge of woodland pond; C; *690.*
Sisyrinchium albidum Raf.; Blue-eyed-grass. Clearing in woods; L; *625.*
Sisyrinchium angustifolium Miller; Blue-eyed-grass. Bank of Honey Creek; L; *797.*

ORCHIDACEAE (Orchid Family)
Corallorhiza maculata Raf.; Spotted Coral-root. Upland woods; I; *1032.*
Cypripedium reginae Walter; Showy Lady-slipper. Swamp woods; L; *948.*
***Epipactis helleborine* (L.) Crantz**; Helleborine. Moist woods; I; *903*; Europe.
Goodyera pubescens (Willd.) R. Br.; Downy Rattlesnake-plantain. Upland woods; O; *928.*
Habenaria clavellata (Michx.) Sprengel; Club-spur Orchid. Swamp woods; R; *949.*
Habenaria lacera (Michx.) Lodd.; Ragged Fringed Orchid. Upland woods; R; *812.*
Habenaria psycodes (L.) Sprengel; Purple Fringed Orchid. Swamp woods; C; *916.*
Liparis liliifolia (L.) Lindley; Purple Twayblade. Moist woods; L; *1083.**
Spiranthes cernua (L.) Rich.; Nodding Ladies'-tresses. Old field; R; *1075.*
Spiranthes lacera (Raf.) Raf.; Slender Ladies'-tresses. Old field; R; *1002.*

DICOTS

SALICACEAE (Willow Family)
Populus grandidentata Michx.; Bigtooth Aspen. Edge of woods; O; *572.*
Populus tremuloides Michx.; Quaking Aspen. Edge of woods; O; *766.*
***Salix babylonica* L.;** Weeping Willow. Edge of woodland pond; R; *517*; China.
Salix discolor Muhl.; Pussy Willow. Edge of fen; O; *487.*
Salix exigua Nutt.; Sandbar Willow. Thicket in wet field; L; *651.*
Salix petiolaris J. E. Smith; Meadow Willow. Lowland woods; O; *632.*

JUGLANDACEAE (Walnut Family)
Carya cordiformis (Wang.) K. Koch; Bitternut Hickory. Upland woods; C; *1031.*
Carya laciniosa (Michx. f.) G. Don; Shellbark Hickory. Upland woods; I; *1072.**
Carya ovata (Miller) K. Koch; Shagbark Hickory. Upland woods; C; *829.*
Juglans cinerea L.; Butternut. Upland woods; R; *925.*

BETULACEAE (Birch Family)
Alnus rugosa (Duroi) Sprengel; Speckled Alder. Swamp woods; O; *1069.*
Carpinus caroliniana Walter var. *virginiana* (Marsh.) Fern.; Musclewood. Lowland woods; C; *801.*
Corylus americana Walter; Hazelnut. Swamp woods; I; *1068.*
Ostrya virginiana (Miller) K. Koch; Ironwood. Upland woods; C; *821.*

FAGACEAE (Beech Family)
Castanea dentata (Marsh) Borkh.; American Chestnut. Upland woods; R; *1077.**
Fagus grandifolia Ehrh.; Beech. Upland woods; I; *882.*
Quercus alba L.; White Oak. Upland woods; A; *725.*
Quercus bicolor Willd.; Swamp White Oak. Lowland woods; O; *769.**
Quercus coccinea Muenchh.; Scarlet Oak. Old field; I; *780.*
Quercus muehlenbergii Engelm.; Yellow Chestnut Oak. Upland woods; R; *824.*
Quercus palustris Muenchh.; Pin Oak. Edge of woodland pond; R; *943.*
Quercus rubra L.; Red Oak. Upland woods; C; *763.*
Quercus velutina Lam.; Black Oak. Upland woods; A; *723.*

ULMACEAE (Elm Family)
Celtis occidentalis L.; Hackberry. Floodplain; I; *741.*
***Ulmus pumila* L.;** Siberian Elm. Edge of trail; I; *728*; Asia.*
Ulmus rubra Muhl.; Slippery Elm. Moist woods; C; *727.*

URTICACEAE (Nettle Family)
Boehmeria cylindrica (L.) Sw.; False Nettle. Floodplain; O; *877.*
Laportea canadensis (L.) Wedd.; Wood Nettle. Swamp woods; O; *817.*
Pilea fontana (Lunell) Rydb.; Clearweed. Bank of Honey Creek; O; *1059.*

Pilea pumila (L.) A. Gray; Clearweed. Bank of Honey Creek; O; *1064*.
Urtica dioica L. var. *procera* (Willd.) Wedd.; Stinging Nettle. Lowland woods; O; *880*.

ARISTOLOCHIACEAE (Birthwort Family)
Asarum canadense L.; Wild-ginger. Bank of Honey Creek; I; *611*.

POLYGONACEAE (Smartweed Family)
Polygonum aviculare L.; Knotweed. Old field; O; *999*.
***Polygonum cuspidatum* Sieb. & Zucc.**; Mexican Bamboo. Roadside; L; *1043*; Japan.*
Polygonum hydropiperoides Michx.; Mild Water-pepper. Woodland pond; O; *918*.
Polygonum pensylvanicum L.; Pinkweed. Edge of woodland pond; O; *977*.
Polygonum punctatum Ell.; Dotted Smartweed. Marsh; I; *1074*.
Polygonum sagittatum L.; Arrow-leaved Tear-thumb. Edge of woodland pond; O; *976*.
Polygonum scandens L.; False Buckwheat. Old field; I; *1055*.
Polygonum tenue Michx. Old field; I; *1067*.
Polygonum virginianum L.; Jumpseed. Lowland woods; C; *929*.
***Rumex acetosella* L.**; Red Sorrel. Old field; C; *578*; Eurasia.
***Rumex crispus* L.**; Curly Dock. Edge of parking lot; C; *813*; Europe.
***Rumex obtusifolius* L.**; Bitter Dock. Weedy field; O; *841*; Europe.

PORTULACACEAE (Purslane Family)
Claytonia virginica L.; Spring-beauty. Upland woods; A; *463*.

CARYOPHYLLACEAE (Pink Family)
Arenaria lateriflora L.; Sandwort. Upland woods; I; *587*.*
***Cerastium fontanum* Baumg.**; Mouse-ear Chickweed. Edge of trail; C; *607*; Eurasia.
***Dianthus armeria* L.**; Deptford-pink. Right-of-way clearing; I; *811*; Old World.
***Saponaria officinalis* L.**; Bouncing Bet. Old field; L; *895*; Eurasia.
***Silene pratensis* (Rafn) Godron & Gren.**; White Campion. Weedy field; O; *866*; Old World.
***Silene vulgaris* (Moench) Garcke**; Bladder Campion. Edge of trail through old field; C; *717*; Eurasia.
***Stellaria graminea* L.**; Common Stitchwort. Old field; O; *648*; Europe.*
Stellaria longifolia Willd.; Long-leaved Stitchwort. Swamp woods; I; *627*.
***Stellaria media* (L.) Vill.**; Common Chickweed. Edge of parking lot; C; *499*; Eurasia.

NYMPHAEACEAE (Water-lily Family)
Nuphar advena (Aiton) Aiton f.; Spatterdock. Pond; A; *810*.

RANUNCULACEAE (Buttercup Family)
Actaea rubra (Aiton) Willd.; Red Baneberry. Lowland woods; O; *594*.
Anemone cylindrica A. Gray; Thimbleweed. Old field; O; *869*.
Anemone quinquefolia L.; Wood Anemone. Bank of Honey Creek; O; *495*.
Anemone virginiana L.; Thimbleweed. Old field; I; *833*.
Anemonella thalictroides (L.) Spach; Rue-anemone. Lowland woods; C; *525*.
Aquilegia canadensis L.; Columbine. Swamp woods; O; *704*.
Caltha palustris L.; Marsh-marigold. Bank of Honey Creek; C; *465*.
Clematis virginiana L.; Virgin's Bower. Lowland woods; O; *953*.
Coptis trifolia (L.) Salisb.; Goldthread. Lowland woods; I; *1023*.
Hepatica acutiloba DC.; Sharp-lobed Hepatica. Upland woods; O; *507*.
Hepatica americana (DC.) Ker Gawler; Round-lobed Hepatica. Upland woods; O; *471*.
Ranunculus abortivus L.; Small-flowered Buttercup. Lowland woods; C; *508*.
Ranunculus fascicularis Bigelow; Early Buttercup. Wet depression in old field; O; *671*.
Ranunculus flabellaris Raf.; Yellow Water Crowfoot. Woodland Pond; R; *654*.
Ranunculus hispidus Michx. var. *caricetorum* (Greene) T. Duncan; Hispid Buttercup. Bank of Honey Creek; C; *520*.
Ranunculus hispidus Michx. var. *hispidus*; Hispid Buttercup. Bank of Honey Creek; C; *466*.
Ranunculus pensylvanicus L. f.; Bristly Crowfoot. Edge of woodland pond; I; *898*.
Ranunculus recurvatus Poir.; Hooked Crowfoot. Lowland woods; O; *622*.
Thalictrum dasycarpum Fisch. & Avé-Lall.; Purple Meadow-rue. Swamp woods; O; *753*.

BERBERIDACEAE (Barberry Family)

***Berberis thunbergii* DC.**; Japanese Barberry. Upland woods; O; *532*; Asia.*

Caulophyllum thalictroides (L.) Michx. var. *thalictroides*; Blue Cohosh. Lowland woods; R; *545*.

Podophyllum peltatum L.; May-apple. Moist woods; C; *600*.

LAURACEAE (Laurel Family)

Sassafras albidum (Nutt.) Nees; Sassafras. Old field; C; *571*.

PAPAVERACEAE (Poppy Family)

Sanguinaria canadensis L.; Bloodroot. Upland woods; O; *472*.

FUMARIACEAE (Fumitory Family)

Dicentra cucullaria (L.) Bernh.; Dutchman's-breeches. Moist woods; R; *473*.

BRASSICACEAE (Mustard Family)

***Arabidopsis thaliana* (L.) Heynh.**; Mouse-ear cress. Edge of trail; C; *498*; Eurasia.

Arabis canadensis L.; Sickle-pod. Moist woods; I; *772*.

Arabis lyrata L.; Sand Cress. Edge of trail; O; *584*.

***Barbarea vulgaris* R. Br.**; Yellow Rocket. Edge of parking lot; C; *533*; Eurasia.

***Berteroa incana* (L.) DC.**; Hoary Alyssum. Old field; C; *672*; Europe.

Cardamine douglassii Britton; Pink Spring Cress. Lowland woods; O; *467*.

Cardamine pensylvanica Willd.; Pennsylvania Bitter-cress. Lowland woods; C; *618*.

Cardamine bulbosa (Muhl.) BSP; Spring Cress. Seepy bank of Honey Creek; O; *620*.

***Lepidium campestre* (L.) R. Br.**; Field-cress. Right-of-way clearing; O; *645*; Eurasia.

CRASSULACEAE (Orpine Family)

***Sedum telephium* L.**; Live-forever. Upland woods; R; *979*; Eurasia.

PENTHORACEAE (Ditch Stonecrop Family)

Penthorum sedoides L.; Ditch Stonecrop. Muddy bank of Honey Creek; O; *1058*.

SAXIFRAGACEAE (Saxifrage Family)

Chrysosplenium americanum Hooker; Golden Saxifrage. Swamp woods; C; *521*.

Heuchera americana L. var. *hirsuticaulis* (Wheelock) Rosendahl, Butters & Lakela; Alum-root. Lowland woods; R; *790*.

Mitella diphylla L.; Bishop's-cap. Bank of Honey Creek; O; *497*.

Saxifraga pensylvanica L.; Swamp Saxifrage. Swamp woods; C; *662*.

GROSSULARIACEAE (Gooseberry Family)

Ribes americanum Miller; Wild Black Currant. Swamp woods; O; *529*.

Ribes cynosbati L.; Wild Gooseberry. Upland woods; C; *501*.

Ribes triste Pallas; Swamp Red Currant. Bank of Honey Creek; O; *580*.

HAMAMELIDACEAE (Witch-hazel Family)

Hamamelis virginiana L.; Witch-hazel. Moist woods; O; *490*.

ROSACEAE (Rose Family)

Agrimonia pubescens Wallr.; Downy Agrimony. Upland woods; I; *974*.

Agrimonia gryposepala Wallr.; Common Agrimony. Lowland woods; C; *861*.

Amelanchier arborea (Michx. f.) Fern.; Serviceberry. Edge of woods in old field; C; *523*.

Amelanchier laevis Wieg.; Serviceberry. Woods at edge of old field; C; *502*.

Aronia prunifolia (Marsh.) Rehder; Chokeberry. Bank of woodland pond; I; *683*.

Crataegus brainerdii Sarg.; Brainerds Hawthorn. Old field; C; *592*.

Crataegus crus-galli L.; Cockspur Thorn. Old Field; I; *700*.

Crataegus succulenta Link var. *macracantha* (Loudon) Eggleston. Old field; O; *659*.

Fragaria virginiana Miller; Wild Strawberry. Sandy clearing in woods; A; *528*.

Geum canadense Jacq.; White Avens. Lowland woods; C; *803*.

Geum laciniatum Murray; Rough Avens. Upland woods; I; *990*.

Physocarpus opulifolius (L.) Maxim.; Ninebark. Moist woods; C; *760*.

Potentilla fruticosa L.; Shrubby Cinquefoil. Fen; C; *883*.

***Potentilla recta* L.**; Rough-fruited Cinquefoil. Edge of trail; O; *792*; Europe.

Potentilla simplex Michx.; Old-field Cinquefoil. Edge of trail; C; *613*.

Prunus americana Marsh.; Wild Plum. Edge of trail; O; *543*.
***Prunus avium* (L.) L.**; Sweet Cherry. Edge of woods; I; *537*; Eurasia.
Prunus pensylvanica L. f.; Pin Cherry. Upland woods; R; *516*.
Prunus serotina Ehrh.; Wild Black Cherry. Woods; A; *642*.
Prunus virginiana L.; Choke Cherry. Right-of-way clearing; I; *641*.
Malus coronaria (L.) Miller; Sweet Crab. Old field; I; *590*.
***Malus pumila* Miller**; Apple. Upland woods; O; *542*; Eurasia.*
Rosa carolina L.; Pasture Rose. Edge of parking lot; I; *786*.
***Rosa multiflora* Murray**; Multiflora Rose. Edge of parking lot; I; *770*; east Asia.*
Rosa palustris Marsh.; Swamp Rose. Swamp woods; O; *896*.
Rubus allegheniensis Porter; Common Blackberry. Edge of trail; A; *655*.
Rubus flagellaris Willd.; Northern Dewberry. Old field; C; *647*.
Rubus occidentalis L.; Black Raspberry. Swamp woods; C; *681*.
Rubus pubescens Raf.; Dwarf Raspberry. Swamp woods; R; *684*.
***Sorbus aucuparia* L.**; European Mountain-Ash. Edge of trail; I; *987*; Europe.
Spiraea alba Duroi var. *alba*; Meadowsweet. Swamp woods; O; *920*.
Waldsteinia fragarioides (Michx.) Tratt.; Barren-strawberry. Lowland woods; L; *534*.*

FABACEAE (Pea Family)
Amphicarpaea bracteata (L.) Fern.; Hog-peanut. Lowland woods; O; *1016*.
Apios americana Medikus; Groundnut. Swamp woods; I; *982*.
Cercis canadensis L.; Redbud. Edge of parking lot; L; *544*.
Desmodium ciliare (Willd.) DC.; Tick-trefoil. Old field; O; *936*.
Desmodium glutinosum (Willd.) A. Wood; Tick-trefoil. Lowland woods; I; *897*.
Desmodium illinoense A. Gray; Tick-trefoil. Old field; O; *966*.
Desmodium nudiflorum (L.) DC.; Tick-trefoil. Lowland woods; I; *904*.
Desmodium paniculatum (L.) DC. var. *paniculatum*; Tick-trefoil. Clearing in woods; O; *965*.
Desmodium paniculatum (L.) DC. var. *dillenii* (Darl.) Isely; Tick-trefoil. Old field; O; *946*.
Desmodium sessilifolium (Torr.) T. & G.; Tick-trefoil. Old field; O; *958*.
Lathyrus venosus Willd. Edge of trail; I; *718*.
Lespedeza capitata Michx.; Bush-clover. Old field; C; *964*.
Lespedeza hirta (L.) Hornem.; Bush-clover. Old field; C; *962*.
Lupinus perennis L.; Wild Lupine. Old field; L; *595*.
***Medicago lupulina* L.**; Black Medick. Edge of parking lot; C; *663*; Eurasia.
***Medicago sativa* L.**; Alfalfa. Grassy field; I; *844*; Europe.
***Melilotus alba* Medikus**; White Sweet-clover. Edge of parking lot; O; *859*; Old World.
***Trifolium arvense* L.**; Rabbitfoot Clover. Old field; L; *819*; Eurasia.
***Trifolium hybridum* L.**; Alsike Clover. Right-of-way clearing; I; *698*; Eurasia.
***Trifolium pratense* L.**; Red Clover. Old field; C; *664*; Europe.
***Trifolium repens* L.**; White Clover. Edge of trail in old field; C; *720*; Eurasia.
Vicia caroliniana Walter; Wood Vetch. Edge of trail in woods; I; *596*.
***Vicia villosa* Roth**; Hairy Vetch. Right-of-way clearing; I; *695*; Eurasia.

OXALIDACEAE (Wood-sorrel Family)
Oxalis stricta L.; Wood-sorrel. Old field; O; *656*.

GERANIACEAE (Geranium Family)
Geranium maculatum L.; Wild Geranium. Moist woods; A; *597*.
Geranium robertianum L.; Herb Robert. Moist woods; I; *752*.

RUTACEAE (Rue Family)
Zanthoxylum americanum Miller; Prickly-ash. Moist woods; L; *726*.

POLYGALACEAE (Milkwort Family)
Polygala polygama Walter. Old field; I; *828*.
Polygala sanguinea L. Old field; L; *967*.

EUPHORBIACEAE (Spurge Family)
Euphorbia corollata L. var. *corollata*; Flowering Spurge. Old field; C; *779*.
Euphorbia maculata L.; Spurge. Edge of parking lot; O; *955*.

LIMNANTHACEAE (False Mermaid Family)
Floerkea proserpinacoides Willd.; False Mermaid. Lowland woods; I; *514.*

ANACARDIACEAE (Cashew Family)
Rhus glabra L.; Smooth Sumac. Edge of parking lot; L; *826.*
Rhus typhina L.; Staghorn Sumac. Old field; C; *789.*
Toxicodendron radicans (L.) Kuntze var. *negundo* (Greene) Reveal; Poison-ivy. Moist woods; O; *783.*
Toxicodendron vernix (L.) Kuntze; Poison Sumac. Swamp woods; O; *1019.*

AQUIFOLIACEAE (Holly Family)
Ilex verticillata (L.) A. Gray; Michigan Holly. In water at edge of pond; I; *666.*

CELASTRACEAE (Bittersweet Family)
***Celastrus orbiculata* Thunb.**; Oriental Bittersweet. Edge of trail through woods; I; *721*; Asia.*
Euonymus obovata Nutt.; Running Strawberry-bush. Lowland woods; C; *667.*

ACERACEAE (Maple Family)
Acer negundo L.; Box-elder. Edge of woods; O; *494.*
***Acer platanoides* L.**; Norway Maple. Upland woods; O; *714*; Europe.*
Acer rubrum L.; Red Maple. Upland woods; A; *484.*
Acer saccharum Marsh.; Sugar Maple. Upland woods; O; *626.*

BALSAMINACEAE (Touch-me-not Family)
Impatiens capensis Meerb.; Spotted Touch-me-not. Floodplain; L; *867.*

RHAMNACEAE (Buckthorn Family)
Ceanothus americanus L.; New Jersey Tea. Upland woods; I; *822.*

VITACEAE (Grape Family)
Parthenocissus quinquefolia (L.) Planchon; Virginia Creeper. Upland woods; O; *823.*
Vitis aestivalis Michx.; Summer Grape. Roadside drainage ditch; O; *742.*
Vitis riparia Michx.; River-bank Grape. Roadside drainage ditch; O; *743.*

TILIACEAE (Linden Family)
Tilia americana L.; Basswood. Lowland woods; C; *756.*

CLUSIACEAE (St. John's-wort Family)
***Hypericum perforatum* L.**; Common St. John's-wort. Edge of parking lot; C; *787*; Europe.
Hypericum prolificum L.; Shrubby St. John's-wort. Fen; L; *911.*
Hypericum punctatum Lam.; Spotted St. John's-wort. Lowland woods; I; *937.*

CISTACEAE (Rockrose Family)
Helianthemum canadense (L.) Michx.; Frostweed. Edge of blowout in sand; L; *716.*

VIOLACEAE (Violet Family)
Viola affinis Leconte; Thinleaf Blue Violet. Swamp woods; I; *589.*
Viola blanda Willd.; Sweet White Violet. Upland woods; O; *530.*
Viola cucullata Aiton; Marsh Blue Violet. Fen; I; *631.*
Viola labradorica Schrank; American Dogviolet. Swamp woods; C; *619.*
Viola macloskeyi F. E. Lloyd; Northern White Violet. Moist woods; R; *509.*
Viola ×*palmata* L.; Three-lobed Violet. Upland woods; O; *550.*
Viola pedata L. f. *rosea* Sanders; Bird's-foot Violet. Old field; R; *576.*
Viola pubescens Aiton var. *pubescens*; Downy Yellow Violet. Moist woods; C; *504.*
Viola sagittata Aiton var. *sagittata*; Arrow-leaved Violet. Upland woods; O; *601.*
Viola sororia Willd.; Hairy Wood Violet. Grass at edge of parking lot; C; *505.*
Viola striata Aiton; Cream Violet. Moist woods; O; *551.*

ELAEAGNACEAE (Oleaster Family)
***Elaeagnus umbellata* Thunb.**; Autumn-olive. Edge of woods in old field; A; *604*; Asia.

LYTHRACEAE (Loosestrife Family)
***Lythrum salicaria* L.**; Purple Loosestrife. Marsh; L; *858*; Eurasia.*

ONAGRACEAE (Evening-primrose Family)

Circaea lutetiana L. var. *canadensis* L.; Common Enchanter's-nightshade. Lowland woods; C; *830*.

Epilobium ciliatum Raf.; American Willow-herb. Edge of woodland pond; O; *1014*.

Oenothera biennis L.; Common Evening-primrose. Old field; O; *886*.

Oenothera clelandii Deitrich, Raven, & W. L. Wagner; Upland woods; I; *1052*.

ARALIACEAE (Ginseng Family)

Aralia nudicaulis L.; Wild Sarsaparilla. Lowland woods; I; *1022*.

APIACEAE (Carrot Family)

***Alliaria petiolata* (Bieb.) Cavara & Grande**; Garlic Mustard. Edge of trail; C; Eurasia. (This species came in after the 1995 collection. A voucher has not been collected.)

Angelica atropurpurea L.; Purplestem-angelica. Bank of Honey Creek; O; *798*.

Conioselinum chinense (L.) BSP.; Hemlock-parsley. Swamp woods; I; *1020*.

Cryptotaenia canadensis (L.) DC.; Honewort. Moist woods; C; *709*.

***Daucus carota* L.**; Queen-Anne's-lace. Edge of parking lot; C; *848*; Old World.

Heracleum maximum Bartram; Cow-parsnip. Floodplain; L; *782*.

Osmorhiza claytonii (Michx.) C. B. Clarke; Bland Sweet Cicely. Moist woods; C; *603*.

Osmorhiza longistylis (Torr.) DC.; Long-styled Sweet Cicely. Moist woods; O; *549*.

Oxypolis rigidior (L.) Raf.; Cowbane. Lowland woods; I; *917*.

Sanicula gregaria E. Bickn.; Black Snakeroot. Swamp woods O; *649*.

Sanicula marilandica L.; Black Snakeroot. Woods; O; *697*.

Taenidia integerrima (L.) Drude; Yellow-pimpernel. Edge of trail; O; *598*.

***Torilis japonica* (Houtt.) DC.**; Japanese Hedge-parsley. Upland woods near road; O; *890*; Europe.*

Zizia aurea (L.) Koch; Golden Alexanders. Bank of Honey Creek; O; *610*.

CORNACEAE (Dogwood Family)

Cornus alternifolia L. f.; Alternate-leaved Dogwood. Lowland woods; O; *680*.

Cornus florida L.; Flowering Dogwood. Upland woods; O; *524*.

Cornus foemina Miller; Gray Dogwood. Lowland woods; A; *759*.

Cornus stolonifera Michx.; Red-osier Dogwood. Swamp woods; C; *661*.

PYROLACEAE (Wintergreen Family)

Chimaphila maculata (L.) Pursh; Spotted Wintergreen. Upland woods; I; *855*.

Chimaphila umbellata (L.) W. P. C. Barton; Pipsissewa. Upland woods; I; *836*.

Pyrola elliptica Nutt.; Shinleaf. Upland woods; I; *835*.

MONOTROPACEAE (Indian-pipe Family)

Monotropa uniflora L.; Indian-pipe. Upland woods; C; *852*.

ERICACEAE (Heath Family)

Gaultheria procumbens L.; Wintergreen. Upland woods; L; *1006*.

Gaylussacia baccata (Wangenh.) K. Koch; Huckleberry. Edge of woods; C; *617*.

Vaccinium corymbosum L.; Highbush Blueberry. In water at edge of pond; C; *665*.

Vaccinium myrtilloides Michx.; Velvetleaf Blueberry. Edge of woods; C; *616*.

PRIMULACEAE (Primrose Family)

Lysimachia ciliata L.; Fringed Loosestrife. Lowland woods; O; *815*.

Lysimachia lanceolata Walter; Lance-leaved Loosestrife. Lowland woods; I; *871*.

Lysimachia quadriflora Sims; Smooth Loosestrife. Fen; O; *884*.

Lysimachia quadrifolia L.; Whorled Loosestrife. Upland woods; O; *757*.

Lysimachia thyrsiflora L.; Tufted Loosestrife. Edge of woodland pond in water; R; *746*.

Trientalis borealis Raf.; Star-flower. Edge of woodland pond; L; *682*.

OLEACEAE (Olive Family)

Fraxinus americana L.; White Ash. Upland woods; O; *862*.

Fraxinus nigra Marsh.; Black Ash. Lowland woods; O; *776*.

Fraxinus pennsylvanica Marsh.; Green Ash. Lowland woods; O; *788*.

GENTIANACEAE (Gentian Family)
Gentianopsis crinita (Froel.) Ma; Fringed Gentian. Fen; R; *1076*.

APOCYNACEAE (Dogbane Family)
Apocynum androsaemifolium L.; Spreading Dogbane. Right-of-way clearing; L; *856*.
Apocynum cannabinum L.; Indian-hemp. Old field; L; *872*.

ASCLEPIADACEAE (Milkweed Family)
Asclepias incarnata L.; Swamp Milkweed. Marsh; C; *814*.
Asclepias syriaca L.; Common Milkweed. Weedy field; O; *842*.
Asclepias tuberosa L.; Butterfly-weed. Old field; O; *837*.

CONVOLVULACEAE (Morning-glory Family)
***Convolvulus arvensis* L.**; Field Bindweed. Old field; I; *853*; Eurasia.

POLEMONIACEAE (Phlox Family)
Phlox divaricata L.; Wild Blue Phlox. Moist woods; C; *515*.
Phlox pilosa L.; Prairie Phlox. Edge of trail; L; *599*.

HYDROPHYLLACEAE (Waterleaf Family)
Hydrophyllum virginianum L.; Virginia Waterleaf. Lowland woods; I; *1021*.

BORAGINACEAE (Borage Family)
Hackelia virginiana (L.) I. M. Johnston; Beggar's-lice. Upland woods; O; *899*.
Lithospermum caroliniense (J. F. Gmelin) MacMillan; Yellow Puccoon. Old field; I; *755*.

VERBENACEAE (Vervain Family)
Phryma leptostachya L.; Lopseed. Lowland woods; O; *851*.
Verbena hastata L.; Blue Vervain. Marsh; I; *956*.
Verbena urticifolia L.; White Vervain. Lowland woods; I; *963*.

LAMIACEAE (Mint Family)
***Ajuga reptans* L.**; Bugleweed. Bank of Honey Creek; L; *579*; Europe.*
***Galeopsis tetrahit* L.**; Hemp-nettle. Floodplain; O; *978*; Eurasia.
***Glechoma hederacea* L.**; Gill-over-the-ground. Edge of south parking lot; O; *475*; Eurasia.
***Lamium purpureum* L.**; Dead-nettle. Sandy washout in moist woods; O; *503*; Eurasia.*
***Leonurus cardiaca* L.**; Motherwort. Floodplain; L; *878*; Eurasia.
Lycopus americanus W. P. C. Barton; American Water-horehound. Fen; O; *993*.
Lycopus rubellus Moench; Water-horehound. Lowland woods; O; *992*.
Monarda fistulosa L. var. *fistulosa*; Wild-bergamot. Old field; C; *892*.
Monarda punctata L.; Horse Mint. Old field; C; *885*.
Prunella vulgaris L.; Self-heal. Lowland woods; C; *804*.
Pycnanthemum virginianum (L.) B. L. Rob. & Fern.; Mountain Mint. Fen; C; *913*.
Scutellaria galericulata L.; Marsh Skullcap. Marsh; I; *893*.
Scutellaria lateriflora L.; Mad-dog Skullcap. Edge of woodland pond; O; *975*.

SOLANACEAE (Nightshade Family)
Solanum carolinense L.; Horse-nettle. Old field; I; *891*.
***Solanum dulcamara* L.**; Bittersweet. Bank of Honey Creek; I; *795*; Eurasia.

SCROPHULARIACEAE (Snapdragon Family)
Aureolaria pedicularia (L.) Raf. var. *ambigens* (Fern.) Farw.; Annual False Foxglove. Upland woods; L; *984*.
Chelone glabra L.; White Turtlehead. Marsh; I; *1057*.
Linaria canadensis (L.) Dum. Cours.; Blue Toadflax. Right-of-way clearing; C; *643*.
***Linaria vulgaris* Miller**; Butter-and-eggs. Old field near road; L; *1037*; Eurasia.
Mimulus ringens L.; Monkey-flower. Edge of woodland pond; I; *909*.
Pedicularis canadensis L.; Forest-lousewort. Swamp woods; I; *781*.
Pedicularis lanceolata Michx.; Swamp-lousewort. Swamp woods; O; *1038*.
Penstemon hirsutus (L.) Willd.; Hairy Beard-tongue. Old field; I; *701*.
***Verbascum blattaria* L.**; Moth Mullein. Weedy field; I; *843*; Eurasia.
***Verbascum thapsus* L.**; Common Mullein. Sandy clearing in upland woods; I; *879*; Europe.

Veronica anagallis-aquatica L.; Water Speedwell. Bank of Honey Creek in water; L; *1060*.
***Veronica arvensis* L.**; Field Speedwell. In lawn at edge of parking lot; O; *513*; Eurasia.
***Veronica filiformis* J. E. Smith**; Creeping Speedwell. In muck; O; *638*; Asia Minor.*
***Veronica officinalis* L.**; Common Speedwell. Opening in woods; O; *722*; Europe.*
Veronica serpyllifolia* L. var. *serpyllifolia; Thyme-leaved speedwell. Moist woods; O; *646*; Eurasia.
Veronicastrum virginicum (L.) Farw.; Culver's-root. Lowland woods; I; *973*.

OROBANCHACEAE (Broom-rape Family)
Conopholis americana (L.) Wallr.; Squaw-root. Upland woods; C; *668*.

PLANTAGINACEAE (Plantain Family)
***Plantago lanceolata* L.**; Ribgrass. Edge of trail; C; *669*; Eurasia.
***Plantago major* L.**; Common Plantain. Edge of trail; A; *816*; Eurasia.
Plantago rugelii Decne.; Rugel's Plantain. Edge of marsh; I; *557*.

RUBIACEAE (Madder Family)
Cephalanthus occidentalis L.; Buttonbush. Ephemeral woodland pond; L; *1071*.
Galium aparine L.; Cleavers. Moist woods; A; *602*.
Galium boreale L.; Northern Bedstraw. Moist woods; C; *744*.
Galium circaezans Michx. Upland woods; O; *712*.
Galium lanceolatum Torr. Upland woods; C; *754*.
Galium obtusum Bigelow. Bank of Honey Creek; O; *799*.
Galium trifidum L. Marsh; L; *894*.
Galium triflorum Michx. Upland woods; C; *868*.
Mitchella repens L.; Partridge-berry. Lowland woods; O; *765*.

CAPRIFOLIACEAE (Honeysuckle Family)
***Lonicera* ×*bella* Zabel**; Old field; R; *685*; Eurasia.
Lonicera dioica L. *glaucescens* (Rydb.) Butters; Glaucous Honeysuckle. Swamp woods; R; *658*.
***Lonicera morrowii* A. Gray**; Morrow Honeysuckle. Old field; C; *593*; Japan.
Sambucus canadensis L.; Common Elderberry. Swamp woods; C; *791*.
Triosteum aurantiacum E. P. Bickn.; Horse-gentian. Upland woods; O; *715*.
Viburnum acerifolium L.; Maple-leaved Viburnum. Upland woods; O; *724*.
Viburnum lentago L.; Nannyberry. Moist woods; C; *689*.
Viburnum opulus L.; Highbush-cranberry. Moist woods; O; *708*.
Viburnum rafinesquianum Schultes var. *affine* (Bush) House; Downy Arrow-wood. Upland woods; O; *703*.

CAMPANULACEAE (Bellflower Family)
Campanula americana L.; Tall Bellflower. Lowland woods; O; *941*.
Campanula rotundifolia L.; Harebell. Upland woods; I; *900*.
Lobelia cardinalis L.; Cardinal-flower. Marsh; R; *954*.
Lobelia siphilitica L.; Great Blue Lobelia. Bank of Honey Creek; C; *986*.
Lobelia spicata Lam.; Pale Spiked Lobelia. Edge of trail; I; *839*.

ASTERACEAE (Aster Family)
Achillea millefolium L.; Yarrow. Old field; A; *808*.
Ambrosia artemisiifolia L.; Common Ragweed. Edge of trail; O; *957*.
Anaphalis margaritacea (L.) Benth.; Pearly Everlasting. Old field; C; *972*.
Antennaria howellii Greene var. *petaloidea* (Fern.) Bayer; Field Pussytoe. Old field; C; *496*.
Antennaria parlinii Fern. var. *parlinii*; Field Pussytoe. Edge of trail; C; *506*.
***Arctium minus* Bernh.**; Common Burdock. Weedy field; I; *888*; Eurasia.
Artemisia campestris L.; Wild Wormwood. Old field; O; *994*.
Aster macrophyllus L.; Big-leaved Aster. Upland woods; O; *1012*.
Aster novae-angliae L.; New England Aster. Old field; C; *1056*.
Aster ontarionis Wieg.; Lake Ontario Aster. Old field; I; *1066*.
Aster oolentangiensis Riddell; Sky-blue Aster. Old field; C; *1046*.

Aster puniceus L.; Swamp Aster. Swamp woods; O; *1044*.
Aster sagittifolius Willd.; Arrow-leaved Aster. Upland woods; O; *1042*.
Aster umbellatus Miller; Flat-topped Aster. Upland woods; O; *1030*.
Bidens cernuus L.; Nodding Beggar-tick. Edge of woodland pond; C; *1048*.
Cacalia atriplicifolia L.; Indian-plantain. Lowland woods; O; *907*.
***Centaurea maculosa* Lam.**; Spotted Knapweed. Old field; A; *860*; Eurasia.
***Chondrilla juncea* L.**; Skeleton-weed. Old field; C; *922*; Europe.
***Chrysanthemum leucanthemum* L.**; Ox-eye Daisy. Old field; A; *696*; Eurasia.
***Cichorium intybus* L.**; Chicory. Edge of parking lot; O; *902*; Old World.
***Cirsium arvense* (L.) Scop. var. *horridum* Wimmer & Grab.**; Canada Thistle. Weedy field; C; *873*; Eurasia.
Cirsium muticum Michx.; Swamp Thistle. Open swamp woods; O; *985*.
***Cirsium vulgare* (Savi) Tenore**; Bull Thistle. Weedy field; I; *947*; Eurasia.
Conyza canadensis (L.) Cronq.; Horseweed. Sandy old field; O; *995*.
Erigeron annuus (L.) Pers.; Daisy Fleabane. Edge of parking lot; C; *785*.
Erigeron philadelphicus L.; Philadelphia Fleabane. Moist woods; O; *711*.
Erigeron pulchellus Michx.; Robin's-plantain. Old field; C; *762*.
Erigeron strigosus Willd.; Daisy Fleabane. Old field; C; *1033*.
Eupatorium maculatum L. var. *maculatum*; Joe-pye Weed. Marsh; C; *968*.
Eupatorium perfoliatum L.; Boneset. Edge of woodland pond; C; *942*.
Eupatorium rugosum Houtt.; White Snakeroot. Lowland woods; C; *981*.
Euthamia graminifolia (L.) Nutt. var. *graminifolia*; Flat-topped Goldenrod. Marsh; C; *1008*.
Helianthus divaricatus L.; Woodland Sunflower. Grassy field; O; *889*.
***Hieracium aurantiacum* L.**; Orange Hawkweed. Old field; O; *691*; Europe.
***Hieracium caespitosum* Dumort.**; Yellow Hawkweed. Old field; A; *1015*; Europe.
Hieracium scabrum Michx.; Sticky Hawkweed. Old field; O; *923*.
Krigia biflora (Walter) S. F. Blake; Orange Dwarf Dandelion. Old field; I; *745*.
Krigia virginica (L.) Willd.; Virginia Dwarf Dandelion. Sandy upland woods; C; *644*.
Lactuca canadensis L.; Wild Lettuce. Old field; O; *924*.
Liatris aspera Michx.; Blazing-star. Old field; L; *1005*.
Prenanthes alba L.; Rattlesnake-root. Lowland woods; O; *1028*.
Prenanthes altissima L.; Tall White Lettuce. Lowland woods; O; *1036*.
Rudbeckia fulgida Aiton var. *speciosa* (Wender.) Perdue; Showy Coneflower. Fen; O; *912*.
Rudbeckia hirta L. var. *pulcherrima* Farw.; Black-eyed Susan. Old field; A; *793*.
Rudbeckia laciniata L.; Cut-leaf Coneflower. Swamp woods; C; *951*.
Senecio aureus L.; Golden Ragwort. Swamp woods; C; *586*.
Solidago altissima L.; Tall Goldenrod. Old field; I; *996*.
Solidago caesia L.; Bluestem Goldenrod. Lowland woods; O; *1039*.
Solidago canadensis L. var. *hargeri* Fern.; Canada Goldenrod. Old field; C; *908*.
Solidago gigantea Aiton; Late Goldenrod. Swamp woods; O; *1001*.
Solidago hispida Willd.; Hairy Goldenrod. Old field; O; *1034*.
Solidago juncea Aiton; Early Goldenrod. Right-of-way clearing; C; *935*.
Solidago nemoralis Aiton; Gray Goldenrod. Old Field; C; *1045*.
Solidago patula Willd.; Rough-leaved Goldenrod. Lowland woods; I; *1040*.
Solidago riddellii Frank; Riddell's Goldenrod. Fen; O; *1041*.
Solidago rugosa Miller var. *rugosa*; Rough-leaved Goldenrod. Old field; C; *559*.
Solidago speciosa Nutt.; Showy Goldenrod. Old field; C; *1054*.
***Sonchus oleraceus* L.**; Common Sow-thistle. Old field; O; *1010*; Europe.
***Taraxacum officinale* Wiggers**; Common Dandelion. Edge of trail; C; *519*; Eurasia.
***Tragopogon pratensis* L.**; Showy Goat's-beard. Old field; O; *732*; Europe.
Vernonia missurica Raf.; Missouri Ironweed. Old field; C; *945*.

ACKNOWLEDGMENTS

I wish to thank James D. Doyle with whom I spent many hours in consultation, Richard Brewer and Elwood B. Ehrle for helpful comments and guidance, Paul Bieneman for drawing the maps contained herein, Edward G. Voss for verification of county records, and Anton A. Reznicek, for his help in identifying several grass and sedge species. My gratitude is also extended to the Kent County Board of Road Commissioners for permission to use Seidman Park as a research site.

Many thanks are also due my family, especially to my husband Tom for his love, support, and companionship on numerous field excursions.

This study was in partial fulfillment of requirements for the Degree of Master of Science granted by Western Michigan University.

LITERATURE CITED

Ballard, H. E., Jr. 1994. Violets of Michigan. The Mich. Bot. 33 (4): 131–199.

Barnes, B. V., & W. H. Wagner, Jr. 1981. Michigan Trees. Univ. Michigan Press. Ann Arbor, MI. viii + 383 pp.

Brewer, R. 1994. The Science of Ecology, second edition. Saunders College Publishing, New York. xviii + 773 pp.

Britton, N. L., & A. Brown. 1914a. An Illustrated Flora of the Northern United States and Canada. Vol. 1, Ophioglossaceae to Polygonaceae. Reprinted by Dover Publ., Inc. New York. xxix + 680 pp.

_____. 1914b. An Illustrated Flora of the Northern United States and Canada. Vol. 2, Amaranthaceae to Loganiaceae. Reprinted by Dover Publ., Inc. New York. vi + 735 pp.

_____. 1914c. An Illustrated Flora of the Northern United States and Canada. Vol. 3, Gentianaceae to Compositae. Reprinted by Dover Publ., Inc. New York. ii + 637 pp.

Chapman, C. C. 1881. History of Kent County, Michigan. Chas. C. Chapman & Co., Chicago.

Crum, H. A. 1991. A Focus on Peatlands and Peat Mosses. Univ. Michigan Press. Ann Arbor. vii + 306.

Dillenback & Leavitt. [sic] 1870. History and Directory of Kent County, Michigan. Daily Eagle Steam Printing House. Grand Rapids, MI. 319 pp.

Dorr, J. A., & D. F. Eschman. 1970. Geology of Michigan. Univ. Michigan Press. Ann Arbor, MI. viii + 476 pp.

Flora of North America Editorial Committee. 1993. Flora of North America, North of Mexico. Vol. 2. Oxford University Press. New York, NY. xvi + 475 pp.

Gleason, H. A., & A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Second Ed. New York Bot. Gard., NY. lxxv + 910 pp.

Hausenbuiller, R. L. 1978. Soil Science: Principles and Practices. Second Ed. Wm. C. Brown Company Publishers, Dubuque, Iowa. vii + 611 pp.

Kent County Library Staff. 1975. An Historic Tour of Kent County: In Commemoration of the Bicentennial of the American Revolution. 108 pp.

Land Survey Notes. 1837. Original Land Survey Notes, Kent County. Unpublished. Original manuscript only. State Archive. Lansing, Michigan.

MacFarlane, R. B. Alford. 1985. Collecting and Preserving Plants for Science and Pleasure. Arco Publishing, Inc. New York, NY. viii + 184 pp.

Michigan Department of Natural Resources and the Michigan Natural Features Inventory. 1992. Michigan's Special Plants. Michigan Dept. of Nat. Resources, Lansing. 19 pp.

Palmer, M. W., G. L. Wade, & P. Neal. 1995. Standards for the writing of floras. BioScience 45 (5): 339–345.

Siegel, J. 1993. "A Snug Little Place": Memories of Ada, Michigan 1821–1930. Ada Hist. Soc. iix + 120.

Soil Conservation Service. 1984. Soil Survey of Kent County, Michigan. Washington, D.C. iix + 263.

Stearns, F. 1974. The Use of the American General Land Office Survey in Syndynamical Vegetation Analysis. IN: Tuxen, R. & R. Knapp eds. Handbook of Vegetation Science Part VIII: Vegetation Dynamics. Junk. The Hague. pp. 75–80.

Voss, E. G. 1972. Michigan Flora. Part I. Gymnosperms and Monocots. Cranbrook Inst. Sci. Bull. 55 and Univ. Michigan Herb. xv + 488 pp.
_____. 1985. Michigan Flora. Part II. Dicots (Saururaceae-Cornaceae). Cranbrook Inst. Sci. Bull. 59 and Univ. Michigan Herb. xix + 724 pp.
_____. 1996. Michigan Flora. Part III. Dicots (Pyrolaceae-Compositae). Cranbrook Inst. Sci. Bull. 61 and Univ. Michigan Herb. xix + 622 pp.
Woodland, D. W. 1991. Contemporary Plant Systematics. Prentice-Hall, Inc. New Jersey. x + 582 pp.

REVIEW

EDWIN LINCOLN MOSELEY (1865-1948): NATURALIST, SCIENTIST, EDUCATOR. Relda E. Niederhofer and Ronald L. Stuckey. 1998. Hardcover, xxvi + 292 pages. Published by the authors and available from Ronald L. Stuckey, RLS Creations, P.O. Box 3010, Columbus, Ohio 43210. $42 postpaid.

Edwin Lincoln Moseley is not a household word. Except in a very local context in parts of Ohio, he is not a major historical figure.

Of what importance is Moseley? In Botany, he was the first to demonstrate that milk sickness in human beings is caused by drinking milk from cows who have eaten *Eupatorium rugosum*, Asteraceae. He wrote a "Sandusky Flora" in 1899. He studied tree rings as evidence of past climatic regimes. Two vascular plants were named in his honor (but both names have long since been sunk into synonymy). In Zoology, he named two Philippine flycatchers to science, the original color plate reproduced as the frontispiece of this biography. In 1951, Bowling Green State University named its science building "Moseley Hall," in honor of the University's first professor of the natural sciences. The building has since taken on other functions entirely.

It appears that he is best remembered as a teacher and as a man of catholic interests in natural history. In 1885, at age 20, he graduated with a Master of Arts from the University of Michigan. He taught high school for two years in Grand Rapids, Michigan, and subsequently at Sandusky High School, Ohio, 1889-1914. The point is made only indirectly, that high school teaching at this time in America was a very different proposition from what it is today. Indeed, he amassed a natural history museum of 17,000 specimens which in 1938 he moved from Sandusky High School to Bowling Green State University.

Moseley never married. His energies and income were devoted entirely to his work. His eccentricities included eating what his friends had left when they shared a table in a public restaurant and making tomato soup from a [free] serving of hot water and the catsup supplied on the table. The item strikes the reader as more characteristic of an unfortunate homeless person than of a university professor. It is said that he regarded the use of alcohol and tobacco as evidence of poor intelligence, and that he would reduce a student's grade if he saw him smoking on campus. The story is probably apocryphal, but anti-tobacco militants are nothing new.

The authors have done a fine job of incorporating reminiscences by his contemporaries with their own scholarship, such that a picture of the man and his

times emerges. Abundant local history provides the background. The larger historical picture is ignored; for example, Moseley was honored with the University's first appointment of a Professor Emeritus in 1936, and with an honorary doctorate of Humane Letters in 1943, the University's first such honor to a faculty member—the emeritus designation at the depths of the Great Depression, the doctorate in the midst of World War II. The omission of the national and international context keeps the narrative focused on the point of the book. It may sound somewhat hollow, but it is a highly effective device. Niederhofer and Stuckey stick to their knitting. They must have been tempted at least occasionally to wander, but they never do.

I would like to know what Moseley was paid at various points in his career. It may be that such records have long since been destroyed. I would like to know the titles of the courses he taught; obviously, he taught the entire spectrum of sciences and mathematics in high school, and at least for a time at Bowling Green.

In the larger order of things, Moseley left no great mark, like most of us. He played in a small arena before scant crowds. Nonetheless, the authors have done us a service by ordering the events of his life and recording the details. Devotees of local history (Ohio and Michigan) will prize this book; alumni of Bowling Green State will surely want a copy, because so much of Moseley's story is the story of the school itself; and general readers will appreciate the consistent flow of the narrative and the insights into some history most of us knew nothing of. It is fortunate that the two authors, having begun their inquiries into Moseley's life separately, merged their efforts and produced this composite volume—so rich in apposite details and photographs of the period.

——Neil A. Harriman
Biology Department
University of Wisconsin-Oshkosh
Oshkosh, Wisconsin 54901

WHITE PINE BLISTER RUST IN THE FORESTS OF THE HURON MOUNTAIN CLUB, MARQUETTE COUNTY, MICHIGAN

Dana L. Richter
School of Forestry and Wood Products
Michigan Technological University
Houghton, MI 49931
dlrichte@mtu.edu

INTRODUCTION

White pine blister rust is a fungus disease caused by *Cronartium ribicola* Fischer, which was introduced to the U.S. from Europe in 1906 (Sinclair et al. 1987). The disease now severely limits regeneration and survival of white pine (*Pinus strobus* L.) in North America (Tainter and Baker 1996). The disease does not harm other species of pines in the northeast, but all other five-needled pines are susceptible (Sinclair et al. 1987).

The fungus infects through needles, slowly progressing to stem cambium tissue where it produces lesions (cankers) which girdle the branch stem, causing death of tissues from the lesion outward. The disease can be positively identified in late spring and early summer by production of pinkish-orange or rust-colored pustules (aecia) on the cankers on branches or trunks. These pustules represent one of several spore stages of the fungus. Diagnosis of the disease is easiest on younger trees when the cankers are actively producing spores. Trees with older, non-sporulating cankers exhibit dead tops and branches in the upper crown, and flagging of branches where needles are still present but reddened (Tainter & Baker 1996; Katovich & Mielke 1993). Gnawing of infected living branch bark by rodents can also be an indication of the disease because infected bark is made palatable by the presence of the fungus (Tainter & Baker 1996; Sinclair et al. 1987).

Young trees are often killed outright by the disease, while mature trees may suffer die-back and slow growth decline leading to mortality, especially from repeated infections or when compounded by other stress factors (Tainter & Baker 1996; Katovich & Mielke 1993; Miller et al. 1959; Sinclair et al. 1987). Some trees may survive infection, possibly owing to genetic resistance or the inability of the fungus to overwinter in host tissue (Tainter & Baker 1996).

The alternate host of the white pine blister rust fungus is species of *Ribes* (gooseberries and currants). Seven species of *Ribes* are present in the Huron Mountain forests (Wells & Thompson 1976). The fungus must pass through this host, producing spores on leaf lesions in the late summer and fall, before it can reinfect white pine. Infection is constrained by requiring precise temperature and moisture conditions, and thus spores from *Ribes* are limited in their dispersal to only several miles (Tainter & Baker 1996; Sinclair et al. 1987).

The highest hazard zone for white pine blister rust in the northern Lake States

FIGURE 1. Location of the Huron Mountains in Marquette Co. in the Upper Peninsula of Michigan

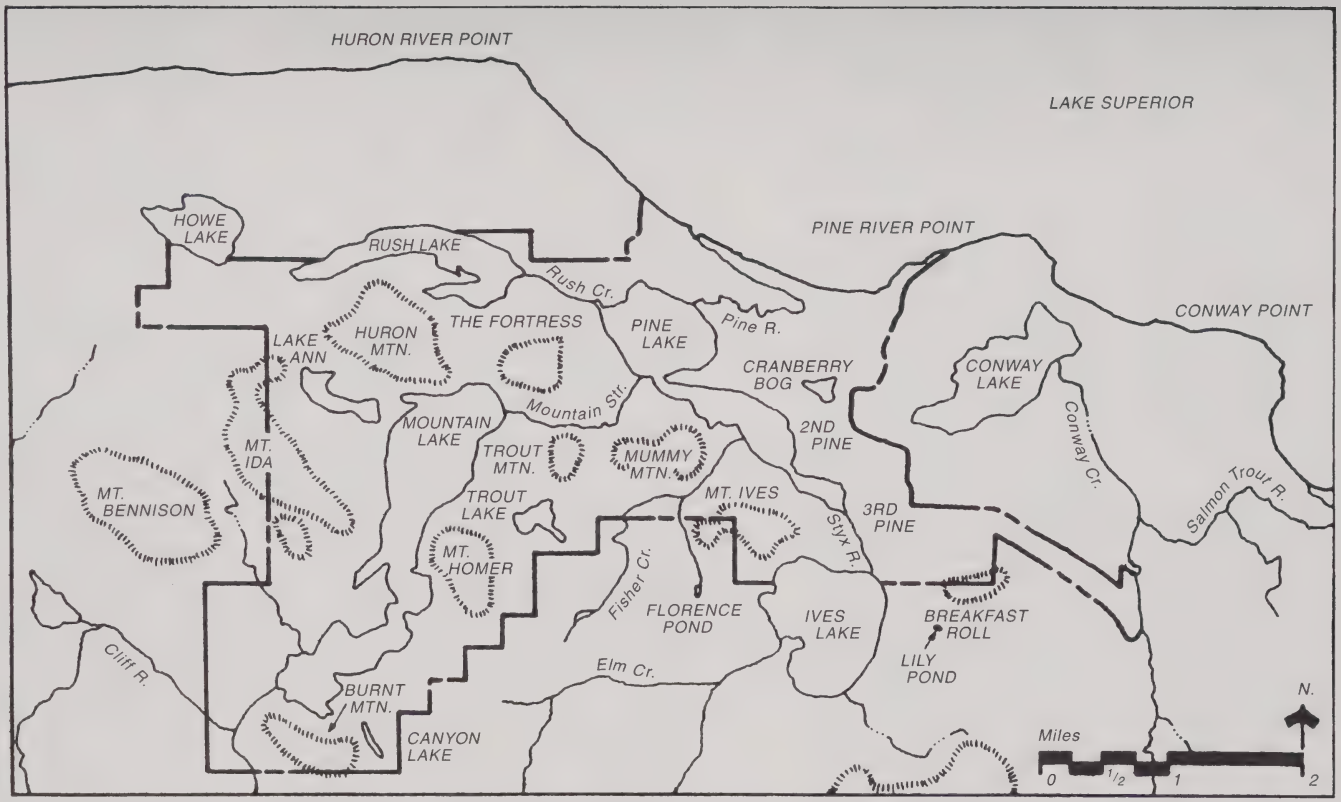

FIGURE 2. Detail of landforms in the Huron Mountains with the old growth Reserve Area outlined (from Simpson et al. 1990).

near Lake Superior is where late summer temperatures are cool and humidity is high for extended periods (Tainter & Baker 1996; Katovich & Mielke 1993). These conditions favor spore formation on leaves of *Ribes* and infection of white pine needles. The Huron Mountains area of Michigan is within the highest hazard zone for the disease (Anderson 1973). However, landforms, topography, micro-climate, and vegetation can all account for variation affecting the spread and incidence of the disease. Also, prevailing air direction and the direction from and abundance of the alternate host may affect infection levels (Tainter & Baker 1996; Anderson 1973).

The forests of the Huron Mountain Club in Marquette Co., Michigan (Figure 1) consist of approximately 20,000 acres (8,094ha) of mixed conifer-hardwood owned by the Huron Mountain Club, the core of which is approximately 8,000 acres (3,237ha) of old growth designated as a "Reserve Area" (Figure 2). These forests lie along the south shore of Lake Superior; elevations range from approximately 600 ft. (183m) at lake level to peaks of 1400–1500 ft. (427–457m) within one to two miles inland. It is not known when white pine blister rust reached this area, but *Ribes* eradication programs were in place in the Lake States in the 1930's and 40's (Anderson 1973). An assessment of the presence and level of white pine blister rust in the Huron Mountain forests was conducted in the spring of 1996.

METHODS

Seven cover types (Simpson et al. 1989, 1990) containing white pine were surveyed for white pine blister rust. White pine trees were examined at 14 sites representing these cover types in an attempt to characterize the entire forest (Table 1). According to Simpson et al. (1990) the "cover" is the dominant overstory tree community. Eleven sites were within the unmanaged old growth Reserve Area, and three sites were in forests directly adjacent to the Reserve Area. Survey sites were estimated at from 10 to 60 acres (4–24ha) in size. Sites 1 through 9 were surveyed June 7–10, 1996; sites 10 through 14 were surveyed June 22–23, 1996.

At each site, from 25 to 31 trees were examined by the investigator and an assistant with the aid of binoculars. The number of trees depended on spacing and what could be accomplished in approximately two hours. An attempt was made to select trees spaced evenly across the total area of the site, particularly seeking open and exposed zones where trees are most susceptible to infection and also most easily examined. Saplings to younger mature trees were chosen for examination, while seedlings and very large, old trees were avoided. Data recorded included estimated height and diameter of trees, presence of positive cankers (fungus sporulating), suspected cankers (old or inactive), branch flagging, dead tops, and living branches with gnawed bark.

RESULTS

A total of 405 trees were inspected within a total area of approximately 460 acres (186ha) (Table 2). White pine blister rust was positively identified by observing sporulating cankers at nine of the 14 sites. Eight sites had ten or more trees with white pine blister rust; site #12 (Trout Mtn.) had the most with 15 diseased trees. Two of the five sites with trees lacking positive cankers had trees with lesions suspected of being caused by the disease. Branch flagging was most prevalent among the indicators observed, being present on trees at all but one site (#8, NE side of Rush Lake).

TABLE 1. Sites in the Huron Mountain forests surveyed for white pine blister rust.

Site #	Upland/ Lowland	Location	Forest Type [1]
1	lowland	north of Cranberry Bog	Jack Pine(1), and White Pine-Hemlock-Hardwood(6)
2	lowland	north of Middle Pine Lake, near cabins, along lake	White Birch-Hemlock-Red Maple(7)
3	upland	north of Ives Lake	Pine-Oak(5), and White Pine-Hemlock-Hardwood(6)
4	lowland	north of Pine Lake, near Lake Superior	Jack Pine(1), and Red and White Pine(3)
5	lowland	Pine River Bridge, north side of Pine Lake	Red Pine(2), and White Birch-Hemlock-Red Maple(7)
6	upland	top of Huron Mountain	Pine-Oak(5), and White Birch-Hemlock-Red Maple
7	upland	north of Rush Lake, west end	Red Pine(2), White Pine-Hemlock-Hardwood(6), and White Birch-Hemlock-Red Maple(7)
8	upland	north of Rush Lake, east end	Red Pine(2), and White Pine-Hemlock-Hardwood(6)
9	upland	southwest of Ives Lake, near Stone House	White Pine
10	upland	south of Mt. Homer	Pine-Oak(5), and White Birch-Hemlock-Red Maple(7)
11	upland	Canyon Lake, east side	Pine-Oak(5), and White Pine-Hemlock-Hardwood(6)
12	upland	Trout Mountain	Pine-Oak(5), and White Pine-Hemlock-Hardwood(6)
13	upland	north side of Howe Lake	White Pine-Hardwood
14	upland	east side of Huron Mountain, north of Mountain Lake	Lichen-Juniper(4), Pine-Oak(5), and White Pine-Hemlock-Hardwood(6)

[1] Numbers refer to map key, Cover Types at the Huron Mountain Club, Simpson et al. 1989.

The number of sites with trees with dead tops corresponded closely to sites with positive cankers, with the exception of site #6 (top of Huron Mtn.). At site #6 no positive cankers were observed; however, the observation of four suspected cankers and 11 trees with branch flagging makes disease presence there highly likely, and the probable cause of the five dead tops observed. Three sites having trees with living branches gnawed by animals are also sites where positive or suspected cankers were found, suggesting that this indicator also correlates with disease presence.

Total number of indicators of disease at a site is a better representation of the incidence of white pine blister rust in a forest than number of diseased trees, since multiple infections may yield separate indicators on a single tree. The site with the highest incidence of white pine blister rust, by totaling all indicators of the disease, is site #10 (S side Mt. Homer, 25 indications observed); site #12 (Trout Mtn.) had the second highest. However, eight sites (including #10 and

TABLE 2. Huron Mountain forests white pine blister rust survey. Summary of data collected by site.

Site#	Approx. Area (acres)	# Trees Inspected	Tree Size Class (height)				Disease Indications Observed						Total Number of Indications
			0–5m	5–10m	10–20m	20–40m	Diseased Trees	Positive Cankers	Suspected Cankers	Branch Flagging	Dead Tops	Animal Damage	
1	10	29	1	13	11	4	6	1	0	5	0	0	6
2	20	25	10	12	3	0	3	0	0	3	0	0	3
3	50	30	2	10	15	3	12	4	0	11	5	1	21
4	30	30	7	11	11	1	2	1	0	1	0	0	2
5	20	30	3	9	17	1	2	0	0	2	0	0	2
6	40	30	0	20	10	0	11	0	4	11	5	0	20
7	40	27	2	14	8	3	3	0	1	3	0	0	4
8	30	23	2	9	10	2	0	0	0	0	0	0	0
9	10	31	9	12	6	4	10	3	3	10	2	0	18
10	60	30	2	4	18	6	11	2	8	10	3	2	25
11	20	30	2	14	12	2	11	3	5	10	3	1	22
12	40	30	5	3	18	4	15	4	3	14	3	0	24
13	30	30	0	10	11	9	11	2	5	11	3	0	21
14	60	30	0	10	15	5	14	3	1	14	2	0	20
Totals:	**460**	**405**	**45**	**151**	**165**	**44**	**111**	**23**	**30**	**105**	**26**	**4**	———

TABLE 3. Huron Mountain forests white pine blister rust survey. Size class of diseased trees showing positive cankers, suspected cankers, and branch flagging.

Tree Size Class	# Trees Inspected	Total Trees with			% Disease Incidence
		Positive Cankers	Suspected Cankers	Branch Flagging[1]	
0–5 m	45	1	1	2	8.8
5–10 m	151	6	6	16	18.5
10–20 m	165	8	19	45	43.6
20–40 m	44	8	5	14	61.4

[1] other than those trees with positive or suspected cankers

#12) had from 18 to 25 total indications observed, suggesting a high incidence of the disease at these sites as well.

Most of the trees inspected (78%) were from 5 to 20 m in height (Table 3). Trees 0–5 m (45 total inspected) were seldom observed with cankers or flagging (8.8% disease incidence). As tree size class increased, so did the proportion of trees with disease indicators. Though only 44 trees were inspected which were 20–40 m in height, the percentage of these trees with disease indicators was higher than in any other size class (61.4% disease incidence).

DISCUSSION

White pine blister rust appears to be present to a considerable degree in the Huron Mountain forests. This finding is consistent with Anderson (1973), who rated the northern Lake States as a high hazard zone for the disease. It is present in forest cover types wherever white pine is found, especially the pine-oak and white pine-hemlock-hardwood types. Also, disease indicators were found in the jack pine and red and white pine types, although these types were present at only three sites examined.

It was found that the taller a tree, the greater likelihood of white pine blister rust infection. Perhaps the fundamental relationship here is with tree age, since older trees have had a longer time available to contract the disease. Additionally, it is also known that susceptibility of needles to infection increases with age (Tainter & Baker 1996).

A higher incidence of white pine blister rust appears to be present beginning approximately one mile inland from Lake Superior, in principally upland areas. Sites on the tops of mountains tended to have a greater level of the disease than lowland sites. This may be because white pine trees are often found in the open on the sparsely forested hilltops and are more susceptible to infection by windborne spores there.

The healthiest stands of white pine appear to be in the areas where red and jack pine are dominant and white pine is intermixed, generally nearer to Lake Superior. The lower level of the disease in these areas may be the result of

micro-climatic effects determining the conditions for infection (e.g., drier conditions during spore dissemination, lack of *Ribes,* or unfavorable winds during infectious periods). A particularly impressive, healthy stand of upland older white pine is found on the east side of Canyon Lake (site #11), where a high level of disease might otherwise be expected.

CONCLUSIONS

White pine blister rust is a disease that the white pine tree has had to contend with since the disease was introduced to North America. Natural resistance to the disease and other factors limiting infection make it unlikely that white pine will be eliminated by the pathogen (Tainter & Baker 1996). Increased genetic resistance may also develop within the white pine population with continued exposure to the disease.

Although this study was preliminary, the number of sites and trees infected with white pine blister rust that were found within the forests of the Huron Mountain Club suggests a significant impact to the white pine population there. White pine blister rust will likely continue to infect trees, contributing to long-term effects on forest composition and biodiversity. This is not entirely unfavorable since even standing dead trees (snags), dead tops and downed wood are important for a range of forest organisms, including fungi, arthropods, birds, and mammals.

ACKNOWLEDGMENTS

This study was made possible by funds provided by the Huron Mountain Wildlife Foundation and Michigan Technological University. Dr. and Mrs. W. R. Manierre and Dr. D. C. L. Gosling provided valuable discussions regarding the ecology of the Huron Mountain Club forests. The Huron Mountain Club is gratefully acknowledged for maintaining these forests for research.

LITERATURE CITED

Anderson, R.L. 1973. A summary of white pine blister rust research in the Lake States. U.S.D.A. Forest Serv. Gen. Tech. Rept. NC-6. 12pp.

Katovich, S., & M. Mielke. 1993. How to manage eastern white pine to minimize damage from blister rust and white pine weevil. U.S.D.A. Forest Service. Leaf. NA-FR-01-93. 14pp.

Miller, D.R., J.W. Kimmey, & M.E. Fowler. 1959. White pine blister rust. U.S.D.A. Forest Service, Pest Leaf. 36. 8pp.

Simpson, T.B., P.E. Stuart, & B.V. Barnes. 1989. Cover Types at the Huron Mountain Club (map). Huron Mountain Wildlife Found., Big Bay, MI.

Simpson, T.B., P.E. Stuart, & B.V. Barnes. 1990. Landscape ecosystems and cover types of the Reserve Area and adjacent lands of the Huron Mountain Club. Occas. Pap. of the Huron Mountain Wildlife Found. No. 4., Big Bay, MI. 128pp.

Sinclair, W.A., H.H. Lyon, & W.T. Johnson. 1987. Diseases of Trees and Shrubs. Comstock Publ. Assoc., Cornell Univ. Press, Ithaca, N.Y. 575pp.

Tainter, F.H., & F.A. Baker. 1996. Principles of Forest Pathology. John Wiley and Sons, New York. 805pp.

Wells, J.R., & P.W. Thompson. 1976. Vegetation and Flora of the Huron Mountains. Occas. Pap. of the Huron Mountain Wildlife Found. No. 3. Big Bay, MI. 59pp.

PUBLICATIONS OF INTEREST

RARE PLANTS OF MINNESOTA'S ARROWHEAD. Deborah Shubat & Gary Walton. Olga Lakela Herbarium, Department of Biology, University of Minnesota–Duluth, Duluth, Minnesota 55812. 1997. x + 112 pp. $10.00, plus $0.75 tax, plus $1.50 shipping. This is a wire-bound, pocket-sized guide, to the endangered, threatened, and special concern plants on Minnesota's updated list and which have been found in Cook, Lake, St. Louis, and Carlton counties—a slightly larger area than covered in Lakela's *A Flora of Northeastern Minnesota* (1965). The authors omit sedges and grasses along with some additional species for which specimens were not available in the Olga Lakela Herbarium. Altogether, 56 species of vascular plants are treated, each with two facing pages: one with description, habitat, distribution map, and status information; the other with a remarkably good color rendition of a herbarium specimen (with superposed ruler showing both metric and English scales). The very brief introduction includes good advice on documenting records and a coded list for reference sources. The species appear in alphabetical order of scientific names. There is no key. It is revealing to see how well a color photocopy can illustrate a plant—more realistic than a line drawing! A few are below average (unlike the children in another Minnesota site), especially *Utricularia resupinata*, which shows nothing of the lovely purple corolla. The descriptions are not likely to be as helpful as the illustrations, for they often fail to stress the good key characters. For example, for *Osmorhiza berteroi* [*O. chilensis*] there is no mention of the absence of bracts at the base of the umbel rays and pedicels or of the fruit constriction just below the beak, which together make identification of this species certain. Similarly, the leaves of *Littorella uniflora* are said to "resemble sterile *Ranunculus reptans*, which also has narrrow linear leaves"—without mention of the uniqueness of *Littorella* leaves, which are terete, thickest at the middle, *tapering* thence to the apex. While Michigan readers may be surprised to see such species as *Tsuga canadensis, Claytonia caroliniana,* and *Hudsonia tomentosa* listed, they will also have an opportunity to see what ranges very close (especially to Isle Royale) and ought some day to be found in this state, e.g., *Rubus chamaemorus, Adoxa moschatellina, Caltha natans, Sparganium glomeratum*. Get out there and look!

WETLAND PLANTS OF ONTARIO. Steven G. Newmaster, Allan G. Harris, & Linda J. Kershaw. Lone Pine Publishing, 1901 Raymond Ave. SW, Suite C, Renton, Washington 98055; or 206, 10426 81 Ave., Edmonton, Alberta, Canada T6E 1X5. 1997. 240 pp. $19.95 US, $24.95 Can. Published with support from the Canadian Forest Service and Ontario Ministry of Natural Resources, this paperback guide (which will fit in a large pocket) includes well over 400 color photos (mostly good to excellent) and about 300 line drawings. It covers plants of peatlands, swamps, marshes, lakes, and rivers. Besides the species more fully treated as to description and habitat, additional species of the same genera or families are often mentioned with a few words of distinction and frequently an illustration. The arrangement is by assorted groups, such

as "Trees," "Sedges," "Aquatics," "Horsetails," "Bryophytes." Fortunately, there is an index to scientific names and others to common names (French and English). There are numerous helpful observations on natural history, folklore, habitat, frequent associates, synonymy, and other aspects (but no traditional keys). The comprehensive definition of wetland and consequent large number of included and illustrated species will make this densely packed picture-guide very useful anywhere in the Great Lakes region. The long list of references includes too many typographical and other errors (including attributing four titles to University of Michigan Press that were in fact never published by that press). The color photo said to be *Lysimachia terrestris* actually shows an *Agrimonia* and the one for *Potamogeton robbinsii* shows *P. epihydrus*. Labels for the drawings of *Sparganium emersum* and *S. eurycarpum* are reversed. And one final nit to pick: I have never seen the capillary submersed leaves of *Juncus militaris* as long as the 6 meters stated in this work, and doubt very much that they ever attain such a length, even in deep water!

GREAT LAKES COASTAL PLANTS. Walter J. Hoagman. MSU Outreach Communications, East Lansing. 1994. 135 pp. $7.95. Following a good introduction to shoreline terminology, laws, and habitat, this little paperback treats 113 species "selected as the most commonly encountered." Note that while common these are not necessarily especially characteristic of the dunes (justifying inclusion of, e.g., the ubiquitous king devil hawkweed, spotted knapweed, mullein, and other weeds). Plants of beaches, dunes, interdunal hollows, and rocky shores are included, but not those of shoreline marshes—although the habitat for each species is rarely revealed. The stated "purpose of this book is to make learning the common shore plants easy for the average person." I have no complaint with so worthy a purpose, but do regret that to accomplish it apparently requires the use of botanical misinformation. The basic two types of flowers "are regular flowers, which have a single spread of petals all of one color, and composite flowers, which have small, flat petals surrounding a bushy center portion." Sedges do not have "tough, wiry seeds [or any other kind] on ends of stalks;" cacti do not have "cylindrical heads"; goat's-beard does not have "flowers . . . in conical pods"; etc. "Similar species" are usually mentioned, a potentially helpful technique, but, for example, the only one mentioned under butterwort is pitcherplant, the sole stated difference being that the latter "has ascending basal leaves." Pitcher's thistle, wormwood, and red windflower are all included, but the stated differences deal only with flowers; those who find the similar *foliage* of these plants difficult to distinguish find no help for plants before they bloom. The author promises better illustrations in a revised edition, which one hopes will include other improvements as well, for a guide of this type could be very useful for visitors to our shores.

THE LIFE AND WISDOM OF GWEN FROSTIC. Sheryl James. Sleeping Bear Press, Box 20, Chelsea, Michigan 48118. 1999. 110 pp. $17.95. This slim little hardcover volume tells the fascinating story of a rare and cherished Michigan institution, the indomitable Gwen Frostic, now 93 years young and still

producing her linoleum block print stationery, charming books, and other products that capture Nature's beauty so well. The author (whose article on Miss Frostic, excerpted from this book, many readers may have enjoyed in *Michigan History* for September/October 1999), says in her foreword: "Shrewd, smart and entertaining, Gwen can hold her own with anyone and is known for her apt one-liners . . . " The book sparkles with a number of such pithy remarks besides relating the story of a woman who overcame (indeed, essentially ignored) lifelong physical disability, is fiercely independent and a successful business person, and above all is a lover of the outdoors. The author encountered great reluctance on the part of her subject to be interviewed, so much of the biography comes from previous sources. "My job is not to educate but to help people feel the beauty of nature," she quotes Gwen. "I try to get them to feel the need for beauty and the need for everything to live for us to live. This is more basic." Gwen Frostic is no stranger to the Michigan Botanical Club, of which she has long been an honorary member. The very first number of *The Michigan Botanist* (March 1962) reported some news: "Gwen Frostic, of Frankfort, Michigan, whose 'Presscraft Papers' display her artistic skill with our wild plants and birds, has bought a farm on both sides of the Betsie River, [and] has invited the [Northwestern] chapter to spend the day there in the spring." She also designed and presented to the Club two handsome posters promoting protection of wildflowers. (The first, produced in 1964, was pictured in *Mich. Bot.* 4: 10. 1965.)

A FACE IN THE ROCK: The Tale of a Grand Island Chippewa. Loren R. Graham. Island Press / Shearwater Books, 1718 Connecticut Ave. N.W., Washington, D. C. 20009. 1998. 160 pp. $22.00 (cloth) [a paperback ed. is $12.95 from University of California Press]. Having spent several days on Grand Island in July (1999) with the Michigan Natural Areas Council monitoring team and had the chance to meet this book's author (who summers in North Light there), I was eager to read this account. While still listed as in print, the hardcover edition turned up just at my time of need in a catalog of publishers' remainders for just $4.95. It will pay to find a copy at either price, for the volume is a skillful, very well written, highly readable blend of history, carefully researched oral and written tradition, and some fiction when needed to tie the story together. It represents a 35-year labor of love by a professional historian, and tells the story, in a gripping way, of a band of Native Americans who once inhabited Grand Island, in Lake Superior just out from Munising—an island almost of the same area as Manhattan, but now with no permanent residents and recently dedicated as a National Recreation Area, to be kept relatively undeveloped. "Powers of the Air," the hero to whom the book is dedicated, would, I think, be pleased.

——Edward G. Voss
University of Michigan Herbarium

EDITORIAL NOTICE

ANNOUNCEMENT OF NEW EDITOR

This is the last issue I will produce as editor of *The Michigan Botanist*. I have greatly enjoyed working with the authors, reviewers, and editorial board of the journal, and I will miss my contact with many of you. I am sorry to be leaving the editorship at this time, just when we have started to see an upsurge in submissions to the journal, and just as my own life has started to settle down. Over the last several years, I have struggled to become established as a self-employed environmental consultant, dealt with three years of serious health problems that made working difficult, and lost my mother and several close friends. The contingencies of my life have sometimes forced me to postpone my volunteer work on the journal, with the result that issues have often been clustered rather than regularly spaced, and it has taken much longer than it should have to process some manuscripts. To the authors and others who were inconvenienced by this, I apologize again and thank you for your patience.

The journal's primary difficulty continues to be a dearth of manuscripts. I urge all of you to contribute manuscripts and encourage others (students, colleagues, friends) to do likewise. Collect all those notes and specimen records you've being accumulating and publish a flora of that local park or natural area. Report a Noteworthy Collection. Follow Ruth MacFarlane's lead and investigate the meaning of an unusual or interesting plant name. Help your students to turn those independent projects into manuscripts. *The Michigan Botanist* has always been a good place for students to begin their publishing careers; the editors have always been willing to take more time than those at big national journals to help students with constructive criticism and suggestions. If you're asked to review a manuscript, do it promptly (and don't force the editor to have to dun you for it!).

As of the next issue of *The Michigan Botanist*, the new editor will be Dr. Neil Harriman of the University of Wisconsin-Oshkosh. Neil is a long-time member of the Editorial Board, and has long served as our book review editor. He has also been performing the daunting task of preparing the three-year indices for the journal. He will do a fine job as editor, and I hope you will give him your full cooperation and respect. All manuscripts and other editorial correspondence should be sent directly to him. His address is:

Dr. Neil Harriman
Department of Biology
University of Wisconsin-Oshkosh
Oshkosh, WI 54901
harriman@uwosh.edu

Several people have been particularly helpful to me, and have eased the often thankless job of editor. I especially want to thank Neil Harriman, for compiling and formatting the three-year indices, being ready to review manuscripts at a moment's notice, and taking care of book reviews; Vivian Bradbury and her employees at Sans Serif, for doing such an excellent job of typesetting the journal, teaching me about typesetting and printing, and catching problems that I missed; and, most of all, previous editors Ed Voss and Rich Rabeler, for giving me many hours of instruction and advice, making many useful suggestions, and providing moral support in difficult times.

——Barbara J. Madsen

The "January 1998" issue (Vol. 37, #1) was mailed Nov. 7, 2000; the "March 1998" issue (Vol. 37, #2) was mailed Jan. 11, 2001.

United States Postal Service

Statement of Ownership, Management, and Circulation

1. Publication Title	2. Publication Number	3. Filing Date
THE MICHIGAN BOTANIST	3 4 4 - 6 4 0	2000
4. Issue Frequency	5. Number of Issues Published Annually	6. Annual Subscription Price
4/YR	4	$16/YR

7. Complete Mailing Address of Known Office of Publication *(Not printer)* *(Street, city, county, state, and ZIP+4)*
HERBARIUM NORTH UNIVERSITY BLDG
THE UNIVERSITY OF MICH
ANN ARBOR MICH 48109-1057

Contact Person

Telephone

8. Complete Mailing Address of Headquarters or General Business Office of Publisher *(Not printer)*
THOMAS K CLOUSE
32965 UNIAN
WESTLAND MI 48185-2750

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor *(Do not leave blank)*

Publisher *(Name and complete mailing address)*
MICHIGAN BOTANICAL CLUB INC
c/o HERBARIUM N UNIVERSITY BLDG
THE UNIVERSITY OF MICH; ANN ARBOR MICH 48109-1057

Editor *(Name and complete mailing address)*
BARBARA MAHLER; HERBARIUM; NORTH UNIVERSITY BLDG
THE UNIVERSITY OF MICH
ANN ARBOR MICH 48109-1057

Managing Editor *(Name and complete mailing address)*
SAME

10. Owner *(Do not leave blank. If the publication is owned by a corporation, give the name and address of the corporation immediately followed by the names and addresses of all stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, give the names and addresses of the individual owners. If owned by a partnership or other unincorporated firm, give its name and address as well as those of each individual owner. If the publication is published by a nonprofit organization, give its name and address.)*

Full Name	Complete Mailing Address
NO DIFFERENT FROM PUBLISHER; NEW PARTY; NO STOCK	

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check box → ☐ None

Full Name	Complete Mailing Address
NONE	

12. Tax Status *(For completion by nonprofit organizations authorized to mail at nonprofit rates)* *(Check one)*
The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes:
☐ Has Not Changed During Preceding 12 Months
☐ Has Changed During Preceding 12 Months *(Publisher must submit explanation of change with this statement)*

PS Form **3526**, September 1998 *(See Instructions on Reverse)*

13. Publication Title	14. Issue Date for Circulation Data Below
THE MICHIGAN BOTANIST	JAN '98

15. Extent and Nature of Circulation			Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies *(Net press run)*			787	799
b. Paid and/or Requested Circulation	(1)	Paid/Requested Outside-County Mail Subscriptions Stated on Form 3541. *(Include advertiser's proof and exchange copies)*	604	630
	(2)	Paid In-County Subscriptions *(Include advertiser's proof and exchange copies)*	56	55
	(3)	Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Non-USPS Paid Distribution	0	0
	(4)	Other Classes Mailed Through the USPS	0	0
c. Total Paid and/or Requested Circulation *(Sum of 15b. (1), (2),(3),and (4))* ▶			660	685
d. Free Distribution by Mail *(Samples, complimentary, and other free)*	(1)	Outside-County as Stated on Form 3541		
	(2)	In-County as Stated on Form 3541		
	(3)	Other Classes Mailed Through the USPS		
e. Free Distribution Outside the Mail *(Carriers or other means)*			85	85
f. Total Free Distribution *(Sum of 15d. and 15e.)* ▶			85	85
g. Total Distribution *(Sum of 15c. and 15f)* ▶			745	770
h. Copies not Distributed			42	29
i. Total *(Sum of 15g. and h.)* ▶			787	799
j. Percent Paid and/or Requested Circulation *(15c. divided by 15g. times 100)*			89	89

16. Publication of Statement of Ownership
☑ Publication required. Will be printed in the MAY, 1998 issue of this publication. ☐ Publication not required.

17. Signature and Title of Editor, Publisher, Business Manager, or Owner — Date
BUSINESS MGR

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

Instructions to Publishers

1. Complete and file one copy of this form with your postmaster annually on or before October 1. Keep a copy of the completed form for your records.
2. In cases where the stockholder or security holder is a trustee, include in items 10 and 11 the name of the person or corporation for whom the trustee is acting. Also include the names and addresses of individuals who are stockholders who own or hold 1 percent or more of the total amount of bonds, mortgages, or other securities of the publishing corporation. In item 11, if none, check the box. Use blank sheets if more space is required.
3. Be sure to furnish all circulation information called for in item 15. Free circulation must be shown in items 15d, e, and f.
4. Item 15h., Copies not Distributed, must include (1) newsstand copies originally stated on Form 3541, and returned to the publisher (2) estimated returns from news agents, and (3), copies for office use, leftovers, spoiled, and all other copies not distributed.
5. If the publication had Periodicals authorization as a general or requester publication, this Statement of Ownership, Management, and Circulation must be published; it must be printed in any issue in October or, if the publication is not published during October, the first issue printed after October.
6. In item 16, indicate the date of the issue in which this Statement of Ownership will be published.
7. Item 17 must be signed.

Failure to file or publish a statement of ownership may lead to suspension of Periodicals authorization.

PS Form **3526**, September 1998 *(Reverse)*

CONTENTS

On the cover: *Honey Creek, looking westward through the woods at the south end of Seidman Park, Kent Co., Michigan. Photographed by Pamela J. Laureto, 14 January, 2001.*

Vol. 37, No. 4

THE MICHIGAN BOTANIST

October, 1998

THE MICHIGAN BOTANIST (ISSN 0026-203X) is published monthly with the exception of Oct, Nov, Dec which are published semi-monthly (15). Subscription rate $16 per year. Periodicals postage rate is paid at Ann Arbor, Michigan. POSTMASTER: Send address changes to *The Michigan Botanist*, c/o Business Manager, P.O. Box 85057, Westland, MI 48185.

Subscriptions: please see below. Single copies: $4.00.

Back issues are available except as noted below. Prices are: volumes 1—13, $3.00 per volume ($0.75 per number); volumes 14—18, $5 per volume ($1.25 per number); volumes 19—21, $8.00 per volume ($2.00 per number); volumes 22—31, $10.00 per volume ($2.50 per number); volumes 32—present, $16.00 per volume ($4.00 per number).

The following issues are available only in complete sets or in sets beginning with volume 2 (marked with an asterisk*): 1(1,2—all published), 2(1*, 4*) 4(3*), 5(1*, 2*, 3*), 7(4*), 9(3*) 19(3), and 26(3).

Institutional subscriptions and all orders for back issues should be addressed to the Business and Circulation Manager, Thomas Clough, *THE MICHIGAN BOTANIST*, P.O. Box 85057, Westland, MI 48185; tcloug@attglobal.net. Address changes should likewise be sent to him.

On all editorial matters, please contact: Neil A. Harriman, Editor, Biology Department, University of Wisconsin-Oshkosh, Oshkosh, WI 54901; 920. 424. 1002 (office); or at 5188 Bittersweet Lane, Oshkosh, WI 54901; 920. 233. 1973 (home); harriman@uwosh.edu—please use e-mail whenever possible.

Articles dealing with any phase of botany relating to the Great Lakes Region may be sent to the Editor at the address above. In preparing manuscripts, authors are requested to follow our style and suggestions in "Information for Authors": (volume 28, p. 43; volume 29, p. 143), **except** please omit all abbreviations in journal and book titles. Smaller contributions not involving illustrations may be submitted as e-mail attachments (indicate format, preferably WordPerfect, DOS or Windows) or incorporated into the body of an e-mail.

THE MICHIGAN BOTANICAL CLUB

Membership is open to anyone interested in its aims: conservation of all native plants; education of the public to appreciate and preserve plant life; sponsorship of research and publication on the plant life of the State and the Great Lakes area in general, both in the USA and in Canada; sponsorship of legislation to promote the preservation of Michigan's native flora; establishment of suitable sanctuaries and natural areas, and cooperation in programs concerned with the wise use and conservation of all natural resources and scenic features.

Dues are modest, but vary slightly among the chapters and with different classes of membership. Persons desiring to become state members (not affiliated with a local chapter, for which contact persons are listed below), may send $17 annual dues (in US funds only) to the Membership Chairperson listed below. In all cases, dues include a subscription the *THE MICHIGAN BOTANIST*.

President: Patrick Fields, 2920 Trudy Lane, Lansing, MI 48910; fieldspa@msu.edu
Treasurer: David Steen, Biology Department, Andrews University, Berrien Springs, MI 49104; steen@andrews.edu
Membership Chairperson: Alta Lahner, 6088 Old Log Trail, Kalamazoo, MI 49009 (for state members; for chapter members, contact the Chapter Presidents below).
Huron Valley Chapter: Larry Nooden, Biology Department, University of Michigan, Ann Arbor, MI 48109; ldnum@umich.edu
Red Cedar Chapter: Jason Kilgore, 6916 Richard Street, Lansing, MI 48911; kilgore@msu.edu
Southeastern Chapter: Kathleen Thomson, 5066 Elmhurst, Royal Oak, MI 48073; 248. 435. 2070
Southwestern Chapter: Ken Kirton, 121 Woodwind Circle, Kalamazoo, MI 49006; ktkirton@aol.com
White Pine Chapter: Dorothy Sibley, 7951 Walnut Avenue, Newaygo, MI 49337; dsibley@mail.riverview.net

OCCURRENCE OF EUROPEAN DEWBERRY, *RUBUS CAESIUS* (ROSACEAE), NATURALIZED IN IOWA AND MICHIGAN[1]

Mark P. Widrlechner
USDA-Agricultural Research Service
North Central Regional Plant Introduction Station
Iowa State University
Department of Agronomy
Ames, IA 50011-1170
email: isumw@iastate.edu

Warren H. Wagner, Jr.[2]
University of Michigan Herbarium
North University Building
Ann Arbor, MI 48109-1057

INTRODUCTION

In late September, 1998, Jimmie D. Thompson, a plant enthusiast, collected two inflorescences from a vigorous bramble near the North Central Regional Plant Introduction Station farm southwest of Ames, Iowa. The unusually late flowering and the atypically compound, corymbose form of the inflorescences suggested that his collection was not taken from a common North American *Rubus* L. A few weeks later, additional collections were made when the senior author accompanied Mr. Thompson to the site. By using the keys in Flora Europaea (Heslop-Harrison 1968) and Brambles of the British Isles (Edees & Newton 1988) and consulting European *Rubus* specimens held in ISC[3] and excellent illustrations in the Czech national flora, Květena České Republiky (Holub 1995), and the Illustrated Companion to Gleason and Cronquist's Manual (Holmgren 1998), the senior author determined the plants to be *Rubus caesius* L., the European dewberry.

In 1990, the junior author observed an unusual bramble in the Waterloo Recreation Area about 32 km WNW of Ann Arbor, Michigan. It displayed certain morphological characteristics that seemed intermediate between blackberries (*Rubus* subgenus *Rubus*) and raspberries (*Rubus* subgenus *Idaeobatus* Focke), such as pruinose, tip-rooting canes resembling *R. occidentalis* L., leafy, corymbose inflorescences, and very sparse fruit set, which might be related to hybrid sterility. During the course of studying the Michigan population, the authors concluded that, rather than being a novel intersubgeneric hybrid, these plants also fit key characteristics of *R. caesius*. *Rubus caesius* is not included in the Flora of Michigan (Voss 1985) and was explicitly excluded from Iowa's flora in a recent revision of *Rubus* for that state (Widrlechner 1998). Our recent discoveries, together with this taxon's absence from many pertinent floristic treatments, prompted this report.

---

[1] Journal Paper No. J-18,408 of the Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa. Project No. 1018 and supported by Hatch Act and State of Iowa funds.

[2] Deceased 8 January 2000.

[3] The abbreviations for herbarium names follow Holmgren et al. (1990).

HISTORICAL ACCOUNT

The introduction of *R. caesius* to the United States from the Old World has been described by Hansen (1937) and Bailey (1941). In 1897, the famous plant explorer, Niels E. Hansen, first formally introduced this species, as *"R. caesius turkestanicus,"* from Russia to the United States. Shortly thereafter, it received the number PI 281 from the USDA's Section of Seed and Plant Introduction (USDA 1898). In 1930, Hansen (1937) tested PI 24377, a later (1908) collection from Siberia, in South Dakota, where it was found to be sufficiently hardy but not very fruitful.

Liberty Hyde Bailey noted that the plant was of greatest value as a soil-stabilizer for covering steep embankments. By the time of Bailey's 1941 publication, *R. caesius* was known to be naturalized in the vicinity of Ithaca, New York and Big Rock at Cherokee Park, Louisville, Kentucky. *Rubus caesius* was also discussed in Fernald's (1950) treatment of *Rubus* in Gray's Manual of Botany, 8th ed., wherein he noted that the plant was locally spreading from cultivation.

We know of no local cultivated sources of *R. caesius* in Michigan, but the source of this plant in Iowa may be the same as that hypothesized by Widrlechner and Rabeler (1991) for *R. parvifolius* L. in Iowa. They noted that from the late 1930s until 1947, the USDA's Soil Conservation Service (SCS), now known as the Natural Resources Conservation Service, maintained a Hill Culture Research Station just southwest of Ames, Iowa, on a site now occupied by the farm of the North Central Regional Plant Introduction Station. Although there is no direct evidence that the Hill Culture Research Station was cultivating *R. caesius*, the 1946 Annual Reports of the Department of Agriculture (Bennett 1946) described research conducted by the Hillculture Research Division on the cultivation of cane fruits on eroded lands in Iowa. Considering Bailey's (1941) comment about the use of this bramble as a groundcover for erosion control, it seems quite plausible that the Hill Culture Research Station may have been the Iowa source population. The origin of our Michigan population remains unknown.

KNOWN COLLECTIONS IN IOWA AND MICHIGAN AND CURRENT STATUS

Iowa

On 20 September 1998, Jimmie D. Thompson noticed a bramble flowering and fruiting out of season on an abandoned pasture just southwest of Ames, Iowa. On 2 December 1998, Thompson and the senior author returned to this site and noted two large, tangled patches, the larger at least 10 meters in diameter, growing with *Aster pilosus*, *Juniperus virginiana*, and *Tridens flavus*. On this late date, although flowers and fruits were no longer present, the display of attractive red-orange leaf color was quite striking. Attractive autumnal coloration in this species was also noted by Bailey (1945). The following collections have been made:

STORY CO.: SW 1/4 NE 1/4 NW 1/4 Sec. 18, T83N R24W, Ames West Quad, elev. 309 meters, *Thompson s.n.*, 20 September 1998 (ISC and MICH), *Widrlechner & Thompson 439*, 2 December 1998 (ISC and MICH).

An earlier, published reference to the occurrence of *R. caesius* in Iowa (Guldner 1960) was erroneous, being based on misidentified collections of *R. roribaccus* (Bailey) Rydb. held at BDI, which represented atypical inflorescences from plants most likely damaged by ice. The absence of any known valid collections of *R. caesius,* as of September, 1998, led the senior author to exclude this taxon from Iowa's flora in his treatment of the *Rubus* of Iowa (Widrlechner 1998). It seems ironic that Thompson's initial collection, confirming this species' presence in Iowa, was made within days of the proofing of the galleys for that report. In addition, during the 1999 field season, Thompson located three additional populations to the east of the original collection in Sections 16 and 17. And although fruit production is generally poor, we suspect that new sites are slowly being colonized by bird- or mammal-mediated seed dispersal.

Michigan

The Michigan population was first noted by the junior author on 29 September 1990 during a field botany class. The fruits with their few large drupelets seemed very remarkable at the time (Figure 1). Later, summer collections were taken when the plants were observed in full flower. The population grows along the east side of an old road and is 45 m long and up to 4 m wide, with an extension running 35 m into a brushy, open woodland, with *Elaeagnus umbellata*, *Celtis tenuifolia, Populus deltoides*, *Quercus velutina*, and *Sassafras albidum*. The following collections from this population have been made:

WASHTENAW CO.: S Border Sec. 5, T12S R3E, NE side of junction of Ridge Road and Glazier Road in Sylvan Township. Waterloo Recreation Area, just N of Cavanaugh Lake, elev. 307 meters, *W.H. Wagner 90044, Wagner 93000, Robert and Ellen Masta 93007* (MICH).

Other nearby collections

Inquiries to numerous herbaria have produced only two other collections of *R. caesius* from Midwestern states. Through A. Cusick (Ohio Department of Natural Resources) and J. Furlow (OS), the senior author recently received two Ohio collections. The older is from Newberry Township, Miami County: *A.W. Cusick 22093*, 8 September 1982 (OS), and the more recent collection was made near Streetsboro, Portage County: *S.J. Mazzer s.n.,* 27 September 1999 (ISC). The next nearest known collection sites are from Allegheny County, Pennsylvania: *B.L. & J.A. Isaac 11722*, 15 October 1998 (CM, ISC) (which was still in flower on this late date) and from Jefferson County, Kentucky: *M. Slack s.n.*, 23 June 1939, and *M. Slack 3*, 27 May 1941 (BH).

FIGURE 1. European dewberry, *Rubus caesius*, from Washtenaw Co., Michigan (*W.H. Wagner 90044*). Note the peculiar fruits with few drupelets and evidence of insect damage.

DIAGNOSTIC FEATURES

Rubus caesius has tip-rooting, biennial canes armed with small prickles and bears flowers with broadly ovate, white petals and large, black drupelets that do not separate readily from their fleshy receptacles. Plants with such characteristics are commonly known as dewberries and belong to subgenus *Rubus*. *Rubus caesius* is the type species of the Old World section *Caesii* Lejeune & Courtois (Edees & Newton 1988), and is implicated in the parentage of a diverse array of apomictic Old World taxa placed in section *Corylifolii* Lindley (Weber 1981).

There are close phylogenetic affinities between Old and New World members of subgenus *Rubus* (Alice & Campbell 1999). Of the North American sections of subgenus *Rubus*, *R. caesius* most closely resembles section *Flagellares* Bailey, by reason of its perfect flowers (thus ruling out section *Ursini* Rydb., native to western North America), prickly armature, ovate primocane leaf shape, and low-arching, tip-rooting habit. Section *Flagellares* includes a diverse group of dewberries widespread in the Great Lakes states (Davis et al. 1968).

There are, however, at least four diagnostic features that can be used to distinguish *R. caesius* from members of section *Flagellares*.

1. The first-year canes (primocanes) of *R. caesius* are glaucous and tinged red where exposed to the sun. The coloration and bloom on the canes' surface resemble that of the canes of *R. occidentalis*. The canes of members of section *Flagellares* are not glaucous.

2. The stipules of *R. caesius* are ovate-lanceolate, whereas those of section *Flagellares* are linear-lanceolate to linear.

3. The inflorescences of *R. caesius* are corymbose, and its larger inflorescences are comprised of a short terminal corymb subtended by similar axillary corymbs, presenting a complex, paniculate form. Although some members of section *Flagellares* do bear corymbose inflorescences, such branched, complex corymbs do not regularly occur in any taxon in that section.

4. The mature fruits of *R. caesius*, when they form at all, are composed of 1-few (in Europe up to 20), relatively large (up to 6×4.5 mm if only one or two, but smaller with increasing numbers), drupelets that are black and glaucous (Heslop-Harrison 1968). The junior author examined the remains of 113 flowers from the Michigan population of *R. caesius*; only 27 of these produced fruits, with an average of 3.5 drupelets per aggregate. Typical fruits of section *Flagellares* have 12–50 smaller drupelets that lack a bloom.

There may also be phenological differences between *R. caesius* and North American dewberries. *Rubus caesius* tends to flower throughout much of the growing season (Edees & Newton 1988), making it much less determinate than our native dewberries. This phenomenon may be related to a reproductive strategy of producing small numbers of seeds, resulting from pseudogamy (Weber 1981), over a long period of time. Also, we observed plants of *R. caesius* growing much later into autumn than is typical for native dewberries. This is consistent with our observations that many other European trees and shrubs do not cease growth or develop leaf coloration until late in autumn when cultivated in the north central United States.

SUMMARY

Rubus caesius is a rarely noted member of the flora of the north central United States. It is native from Europe east to Siberia and was probably brought to our region because of its cold hardiness and ability to stabilize eroding sites. It may occur more widely in the region, but few records have been located. These first regional records can serve as a baseline to document the introduction

of this exotic shrub into our flora. Diagnostic, morphological and phenological characteristics for distinguishing *R. caesius* from similar, native dewberries are presented, in the hope that field botanists will now better recognize this species and be alert to its potential expansion.

The senior author would be particularly interested to learn of other occurrences of this species in the Midwestern flora.

ACKNOWLEDGMENTS

We sincerely thank Paul Catling, Donald Farrar, William Hess, Gail Nonnecke, and Kenneth Robertson for valuable critiques of this report and Deborah Lewis for all her help in contacting herbaria and processing loans. We are also grateful to Allison Cusick and the curators of A, BH, BHO, CAN, CINC, CLM, CM, DAO, F, GH, ILL, ILLS, JEPS, KE, KSC, MICH, MIL, MIN, MSC, MU, NA, ORE, OS, OSC, TEX, UC, WILLU, WIS, WTU, and YOU for their assistance. The senior author is pleased that this project provided an opportunity to work with, and learn from, Herb Wagner. He had great insights, was willing to share them generously, and will be dearly missed.

LITERATURE CITED

Alice, L.A., & C.S. Campbell. 1999. Phylogeny of Rubus (Rosaceae) based on nuclear ribosomal DNA internal transcribed spacer region sequences. Amer. J. Bot. 86: 81–97.

Bailey, L.H. 1941. Species batorum. The genus Rubus in North America I. Gentes Herbarum 5: 1–64.

———. 1945. Species batorum. The genus Rubus in North America IX. Naturalized European blackberries. Gentes Herbarum 5: 836–856.

Bennett, H.H. 1946. Report of the Chief of the Soil Conservation Service. Annual Reports of Department of Agriculture, 1946. U.S. Dept. of Agriculture, Washington, DC. 65 pp.

Davis, H.A., A.M. Fuller, & T. Davis. 1968. Contributions toward the revision of the Eubati of Eastern North America. Castanea 33: 206–241.

Edees, E.S., & A. Newton. 1988. Brambles of the British Isles. Ray Society, London. viii + 377 pp.

Fernald, M.L. 1950. Gray's Manual of Botany, 8th ed. American Book Co., New York. lxiv + 1632 pp.

Guldner, L.F. 1960. The vascular plants of Scott and Muscatine counties. Davenport Public Mus. Publ. Bot. 1: 1–228.

Hansen, N.E. 1937. Fruits, old and new and northern plant novelties. S. Dakota State Coll. of Agric. Exp. Sta. Bull. 309. 16 pp.

Heslop-Harrison, Y. 1968. Rubus L. IN: Flora Europaea. Volume 2. T.G. Tutin et al. (eds.). Cambridge Univ. Press, Cambridge. pp. 7–25.

Holmgren, N.H. 1998. Illustrated Companion to Gleason and Cronquist's Manual: Illustrations of the Vascular Plants of Northeastern North America and adjacent Canada. New York Bot. Gard., Bronx, NY. xvi + 937 pp.

Holmgren, P.K., N.H. Holmgren, & L.C. Barnett, eds. 1990. Index herbariorum, Part I, 8th ed. Regnum Veg. 120: x + 1–693.

Holub, J. 1995. Rubus L. - ostružiník (maliník, moruška, ostružinec, ostružiníček). IN: Květena České Republiky. B. Slavík (ed.). Academia, Prague. pp. 54–206.

USDA. 1898. Inventory No. 1. Foreign seeds and plants imported by the Section of Seed and Plant Introduction. Numbers 1–1000. U.S. Dept. of Agric., Washington, DC. 81 pp.

Voss, E.G. 1985. Michigan Flora. Part II. Dicots (Saururaceae—Cornaceae). Bull. Cranbrook Inst. of Sci. 59. and Univ. Michigan Herb. xix + 724 pp.

Weber, H.E. 1981. Revision der Sektion Corylifolii (Gattung Rubus, Rosaceae) in Skandinavien und im nördlichen Mitteleuropa. Paul Parey, Hamburg. 229 pp.

Widrlechner, M.P. 1998. The genus Rubus L. in Iowa. Castanea 63: 415–465.

——— & R.K. Rabeler. 1991. Rubus parvifolius (Rosaceae), naturalized in Illinois and Iowa. Mich. Bot. 30: 23–30.

NOTEWORTHY COLLECTION

WISCONSIN

GYPSOPHILA MURALIS L. (Caryophyllaceae). Cushion Baby's Breath.

Previous knowledge. In their preliminary report on the Caryophyllaceae in the Wisconsin flora, Schlising and Iltis (1961) described *Gypsophila muralis* as adventive in Marathon and Sheboygan Counties. Long-time readers of The Michigan Botanist will recall Rabeler's thorough paper (1981) that discussed the occurrence of this attractive little annual weed in Michigan, mapped its historical North American distribution, and compared the plant with two related species. At that time Rabeler indicated that *G. muralis* had not been collected in Michigan since 1900. He later reported on its collection in Gogebic Co., Michigan, in 1986 (Rabeler 1988). His exhaustive search of herbaria turned up collections made after 1960 from Massachusetts, Michigan, New Hampshire, Ohio, Vermont, Wisconsin, and Ontario (Rabeler 1981, 1988). Since 1960, *G. muralis* has been collected in Wisconsin from Eau Claire, Forest, Iron, Marathon, Marquette, Portage, Vilas, and Wood Counties. (Herbaria I consulted: MICH, MIN, OSH, UWEC, UWSP, WIS).

Significance: The significance of the Eau Claire collections is the surprising abundance of the plants, their widespread distribution across the City of Eau Claire, and their peculiar habitat. I first found about a half dozen plants scattered along a sidewalk on the campus of the University of Wisconsin-Eau Claire in 1997. Later that summer I noticed *G. muralis* growing abundantly at a neighborhood park. Interestingly, it was found mostly in an area that is flooded each winter for outdoor ice skating. Over the next two growing seasons I visited more than two dozen city parks and school playgrounds in Eau Claire. *Gypsophila muralis* occurred at each of the 16 parks with outdoor skating rinks. I also found it growing at four other parks that had rinks earlier in the 1990s, but have not been used for skating for at least one winter.

Outdoor rinks are created by leveling the ground with a bulldozer and using the excavated soil to build a foot-high berm around the circumference. In December of each year the oval is flooded from a nearby fire hydrant. During the summer these areas are covered with weedy growth and used for soccer and other warm-weather recreation. Plants of *G. muralis* were most abundant in the rink areas, but were often scattered nearby as well. At eight parks the plants were exceedingly abundant, with densities exceeding several hundred plants per square meter. In spots the diminutive plants are the dominant species, forming a pink haze over the ground during July and August. Common associates in decreasing order of estimated fidelity and abundance include *Potentilla argentea*, *Taraxacum officinale*, *Ambrosia artemisiifolia*, *Matricaria discoidea*, *Oxalis* sp., *Trifolium arvense*, *T. repens*, *Digitaria sanguinalis*, *Verbena bracteata*, and *Plantago major*.

I also searched six parks and school yards that do not have skating rinks, as well as several miles of city boulevards. *Gypsophila muralis* was found only

rarely, usually near the street where snow and ice are deposited by winter plowing. It was completely absent from baseball and soccer fields in parks that lacked rinks, but otherwise supported a weedy flora not too different from the skating areas.

EAU CLAIRE CO.: City of Eau Claire, University of Wisconsin-Eau Claire, along University Drive on upper campus. T27N, R9W, Sec. 30, 1 July 1997, *Rohrer 10353* (UWEC); City of Eau Claire, Lee Street Playground, along Lee St. opposite Fenwick Ave. T27N, R9W, Sec. 21, 9 July 1998, *Rohrer 10371* (UWEC, MICH, WIS); City of Eau Claire, Roosevelt Park, 908 Folsom St. T27N, R9W, Sec. 7, 5 July 1999, *Rohrer 10416* (UWEC, OSH, UWSP); City of Eau Claire, Pinehurst Neighborhood Park, 3523 Delbert Rd. T27N, R9W, Sec. 3, 10 July 1999, *Rohrer 10420* (UWEC, MIN).

LITERATURE CITED

Rabeler, R. K. 1981. Gypsophila muralis. Is it naturalized in Michigan? Michigan Botanist 20: 21–26.

———. 1988. Noteworthy collections. Michigan. Gypsophila muralis. Michigan Botanist 27: 91–92.

Schlising, R. A., & H. H. Iltis. 1961. Preliminary reports on the flora of Wisconsin. No. 46. Caryophyllaceae. Transactions of the Wisconsin Academy of Sciences, Arts and Letters 50: 89–139.

——JOSEPH R. ROHRER
Department of Biology
University of Wisconsin-Eau Claire
Eau Claire, WI 54702-4004

REVIEWS

THE SEDGES (*Carex* L.) OF RUSSIA AND ADJACENT STATES (within the limits of the former USSR). Egorova, Tatyana. St.-Petersburg State Chemical-Pharmaceutical Academy and Missouri Botanical Garden Press. 1999. Hardcover, 772 pp. ISBN 0-915279-67-3. US$49.95 from Brian Gardner, mbgpress@mobot.org; phone 314. 577. 9534; fax 314. 577. 9591. Credit authorizations taken via e-mail, phone, or fax.

At 6.5¢ per page, this is a great bargain. We botanists have Missouri Botanical Garden Press to thank for that. The decision was taken to co-publish this lifetime's work in order to make it more generally available in the West—another of the numerous efforts by the Garden to spur international botanical cooperation. Her work will be of greatest importance to European workers on the west and to workers in the flora of China to the east. American students of the genus will also welcome this book, because there a number of amphi-atlantic or circumboreal species of *Carex*. There are numerous lectotypifications which workers everywhere will have to consult.

The book was written and edited entirely in Russia. It is bilingual throughout, with the Russian first. I cannot read Russian, but it appears that nearly everything in Russian is likewise present in English. Figure captions, keys, descriptions, and the several chapters on more general aspects of the genus *Carex*—all are rendered fully (or nearly so) in English.

Yes, the English is sometimes rough. The editors at MO had no hand in this. Occasionally, the meaning is obscure (p. 372: "As follows from the synonymy, the systematic position of it widespread in Kamchatka and Kurils subspecies was assessed in extermely [sic] different ways, not to mention its misidentifications.") The example cited is an unusual occurrence; for the most part, at least native speakers of English will have no trouble. Given the extent to which English has become the international language of science, the author's decision to make her book bilingual is laudable. (There are places in the English translation of the vast Flora of the USSR, prepared by non-botanical professional translators, which are just as impenetrable.)

Egorova estimates that the genus worldwide includes 2,000 species. In the area covered here, she treats 346 species. The keys are dichotomous and appear to be entirely conventional. The illustrations are abundant and seem to be very well done. Not every species is illustrated. I would offer a rough estimate of 50%. I did not detect a credit line to the illustrator, but it was clearly someone of considerable skill and discernment. The drawings are *not* the over-inked, crude renderings of the original Flora of the USSR, 1935, in English translation 1964.

The illustrations that are present are often far distant from the treatment of the species themselves. They are referred to, but only by figure number, not by page number, and only in the Russian portion. With this book at one's elbow, I feel fairly confident you will put a name properly to a specimen, but it will be a chase.

The bibliography is extensive, with the works originally in Cyrillic cited first in alphabetical order, followed by an alphabetical listing of works originally in Roman alphabet. This must have been a vexing problem to the author, and I judge she has solved it very competently.

THE FLORA OF MANITOULIN ISLAND and the adjacent islands of Lake Huron, Georgian Bay, and the North Channel. J. K. Morton & Joan M. Venn. 3rd Edition. 376 pages, University of Waterloo Biology Series No. 40. Available from Department of Biology, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1. Spiral bound, $27.50; hard bound, $40.00, plus $7.50 postage and handling for Canadian orders, $10.00 postage and handling outside of Canada. Prices are in Canadian dollars. Specify hard bound or ring bound; the review copy is ring bound, and very easy to use. Personal checks are accepted; please send a check payable to "Department of Biology" for the full amount in U.S. dollars, if that is appropriate to your situation, and treat it as a contribution to good science from our friends in Canada.

The first 47 pages of the book are devoted to orienting the reader. The section on the geological history of the islands alone is worth the price of the book. The authors have read and absorbed a variety of technical works, and summed everything up in plain English for those who have had, maybe, an undergraduate course in Geology. It is a model of popularization, without sacrificing accuracy.

There are in general no keys. But in some complex groups, like *Salix* and *Amelanchier*, there are keys, which appear to be very useful. The flora is segmented into ferns, gymnosperms, and angiosperms. Within each of these categories, the arrangement of taxa at all ranks is alphabetical.

There is a segment on pp. 45-46 on new chromosome counts on plants from the Manitoulin region. This is an odd thing to insert into a flora, but maybe my mentioning it here will ensure the data are included in the standard chromosome indexes.

There are 16 pages of color photographs of 124 species, inserted between pp. 170 and 187; these plates are themselves unnumbered, but are counted in the total pagination. They are beautifully photographed and reproduced with great fidelity to the original colors. Finally, there are distribution maps for every species.

The index to scientific and common names occupies eight pages (colored pink) in the middle of the book.

This book deserves a wide readership. I spoke with a colleague, who has long had a summer home on Manitoulin Island, and she was excited there is now a third edition of the standard work. (Her expertise is in Animal Physiology; nonetheless, she wants to know the names of the things around her. Knowing their names is the first step toward caring about them.) I got the impression her copy of the second edition was getting ragged. Botanists of every stripe will thank the authors for a fine piece of scholarship.

This entire Biology series can be found on the web at science.uwaterloo.ca/biology/jcsemple/uwbioser.htm; it is a treasure of information across the field of Biology, at very fair prices, but if you go to the University of Waterloo website, you will never find it. Type in this URL and bookmark it.

——Neil A. Harriman
Biology Department
University of Wisconsin-Oshkosh
Oshkosh, WI 54901
harriman@uwosh.edu

THE BIG TREES OF MICHIGAN
23. Acer saccharum Marshall
Sugar Maple

Elwood B. Ehrle
Department of Biological Sciences
Western Michigan University
Kalamazoo, MI 49008

The largest known Sugar Maple in Michigan is located east of the village of Bear Lake in Manistee County in the Lower Peninsula.

Description of the Species: The Sugar Maple is a member of the Aceraceae; the family contains only two genera, *Acer* and the Chinese genus *Dipteronia*. There are seven kinds of maple native in Michigan. Maples are easily distinguished from other trees by their peculiar winged fruit, a double samara (Fig. 1). Each half of the fruit splits away from the central axis and spins away on the wind. The Sugar Maple is distinguished from other members of the genus by its palmately-lobed leaves, having long, narrow lobes with the sides of the terminal lobe diverging. The leaf sinuses are broad and blunt at the base, and the inner bark of the twigs is rank-smelling.

Location of Michigan's Big Tree: Our largest known Sugar Maple can be found near the village of Bear Lake, Manistee County, MI. To find the tree, take U.S. 31 to the north edge of the village of Bear Lake and turn east on 13-Mile Road. Go 3.3 miles to Big Four Road and turn right (south). Go 1.8 miles to the third white house on the east side of the road. The tree is about a thousand feet southeast of the farm house, and can be seen emerging from a Red Pine plantation. Walk into the pine plantation past 15 rows of pines (about 115′) and the tree can easily be seen. The locality is in section 18, T23N, R14W.

Description of Michigan's Big Tree: The tree has a solid trunk which divides into four major trunks 5′6″ (1.7 m) above the ground. The circumference of the tree at breast height was measured on 26 July 1995 at 225″ (572 cm). The crown spread was measured at 80′ (25 m). The height was measured at 78′ (24 m). The crown spread and height were slightly less than recorded some years by Paul Thompson, because the tree has lost several large branches.

INVITATION TO PARTICIPATE

If you would like to join us in extending this series of articles by visiting and describing one or more of Michigan's Big Trees, please contract the author for help with locations, specifications for taking measurements, and assistance with

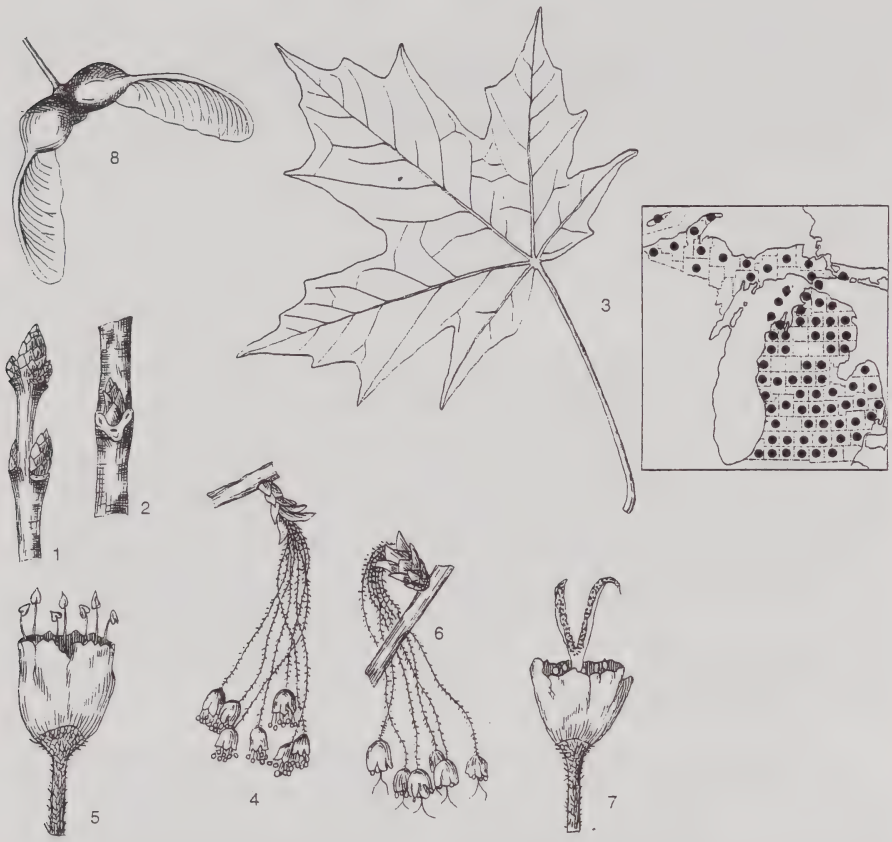

FIGURE 1. Documented distribution in Michigan and characteristics of the Sugar Maple. The map is from Voss (1985); the illustrations are from Barnes & Wagner (1991). 1. Winter twig, ×1; 2. Portion of twig, enlarged; 3. Leaf, ×½; 4. Male flowering twig, ×½; 5. Male flower, enlarged; 6. Female flowering twig, ×½; 7. Female flower, enlarged; 8. Fruit, a double samara, ×1.

the manuscript. The Michigan Botanical Club encourages your involvement in this activity. Please remember to ask permission before entering private property.

DEDICATION

This series of articles is dedicated to the memory of Paul Thompson, Michigan's Big Tree Coordinator for over 40 years, who died in 1994.

LITERATURE CITED

Barnes, B.V. & W. H. Wagner, Jr. 1991. Michigan Trees. A Guide to the Trees of Michigan and the Great Lakes Region. University of Michigan Press, Ann Arbor. viii + 383 pp.

Voss, E. G. 1985. Michigan Flora. Part II. Dicots (Saururaceae-Cornaceae). Bulletin of the Cranbrook Institute of Science No. 59 and University of Michigan Herbarium. xix + 724 pp.

CONTENTS

On the cover: *Dwarf Mistletoe, pistillate* Arceuthobium pusillum Peck *on Black Spruce,* Picea mariana *(Miller) BSP; less commonly, this parasitizes White Spruce,* Picea glauca *(Moench) Voss. (The author of the combination was a German botanist, Andreas Voss, 1857–1924.) Photo courtesy of Sandra L. Planisek, 9755 Bend Drive, Jenison, MI 49428.*

Vol. 37, No. 4

THE

MICHIGAN BOTANIST

October, 1998

THE MICHIGAN BOTANIST (ISSN 0026-203X) is published monthly with the exception of Oct, Nov, Dec which are published semi-monthly (15). Subscription rate $16 per year. Periodicals postage rate is paid at Ann Arbor, Michigan. POSTMASTER: Send address changes to *The Michigan Botanist*, c/o Business Manager, P.O. Box 85057, Westland, MI 48185.

Subscriptions: please see below. Single copies: $4.00.

Back issues are available except as noted below. Prices are: volumes 1—13, $3.00 per volume ($0.75 per number); volumes 14—18, $5 per volume ($1.25 per number); volumes 19—21, $8.00 per volume ($2.00 per number); volumes 22—31, $10.00 per volume ($2.50 per number); volumes 32—present, $16.00 per volume ($4.00 per number).

The following issues are available only in complete sets or in sets beginning with volume 2 (marked with an asterisk*): 1(1,2—all published), 2(1*, 4*) 4(3*), 5(1*, 2*, 3*), 7(4*), 9(3*) 19(3), and 26(3).

Institutional subscriptions and all orders for back issues should be addressed to the Business and Circulation Manager, Thomas Clough, *THE MICHIGAN BOTANIST*, P.O. Box 85057, Westland, MI 48185; tcloug@attglobal.net. Address changes should likewise be sent to him.

On all editorial matters, please contact: Neil A. Harriman, Editor, Biology Department, University of Wisconsin-Oshkosh, Oshkosh, WI 54901; 920. 424. 1002 (office); or at 5188 Bittersweet Lane, Oshkosh, WI 54901; 920. 233. 1973 (home); harriman@uwosh.edu—please use e-mail whenever possible.

Articles dealing with any phase of botany relating to the Great Lakes Region may be sent to the Editor at the address above. In preparing manuscripts, authors are requested to follow our style and suggestions in "Information for Authors": (volume 28, p. 43; volume 29, p. 143), **except** please omit all abbreviations in journal and book titles. Smaller contributions not involving illustrations may be submitted as e-mail attachments (indicate format, preferably WordPerfect, DOS or Windows) or incorporated into the body of an e-mail.

THE MICHIGAN BOTANICAL CLUB

Membership is open to anyone interested in its aims: conservation of all native plants; education of the public to appreciate and preserve plant life; sponsorship of research and publication on the plant life of the State and the Great Lakes area in general, both in the USA and in Canada; sponsorship of legislation to promote the preservation of Michigan's native flora; establishment of suitable sanctuaries and natural areas, and cooperation in programs concerned with the wise use and conservation of all natural resources and scenic features.

Dues are modest, but vary slightly among the chapters and with different classes of membership. Persons desiring to become state members (not affiliated with a local chapter, for which contact persons are listed below), may send $17 annual dues (in US funds only) to the Membership Chairperson listed below. In all cases, dues include a subscription the *THE MICHIGAN BOTANIST*.

President: Patrick Fields, 2920 Trudy Lane, Lansing, MI 48910; fieldspa@msu.edu
Treasurer: David Steen, Biology Department, Andrews University, Berrien Springs, MI 49104; steen@andrews.edu
Membership Chairperson: Alta Lahner, 6088 Old Log Trail, Kalamazoo, MI 49009 (for state members; for chapter members, contact the Chapter Presidents below).
Huron Valley Chapter: Larry Nooden, Biology Department, University of Michigan, Ann Arbor, MI 48109; ldnum@umich.edu
Red Cedar Chapter: Jason Kilgore, 6916 Richard Street, Lansing, MI 48911; kilgore@msu.edu
Southeastern Chapter: Kathleen Thomson, 5066 Elmhurst, Royal Oak, MI 48073; 248. 435. 2070
Southwestern Chapter: Ken Kirton, 121 Woodwind Circle, Kalamazoo, MI 49006; ktkirton@aol.com
White Pine Chapter: Dorothy Sibley, 7951 Walnut Avenue, Newaygo, MI 49337; dsibley@mail.riverview.net

OCCURRENCE OF EUROPEAN DEWBERRY, *RUBUS CAESIUS* (ROSACEAE), NATURALIZED IN IOWA AND MICHIGAN[1]

Mark P. Widrlechner
USDA-Agricultural Research Service
North Central Regional Plant Introduction Station
Iowa State University
Department of Agronomy
Ames, IA 50011-1170
email: isumw@iastate.edu

Warren H. Wagner, Jr.[2]
University of Michigan Herbarium
North University Building
Ann Arbor, MI 48109-1057

INTRODUCTION

In late September, 1998, Jimmie D. Thompson, a plant enthusiast, collected two inflorescences from a vigorous bramble near the North Central Regional Plant Introduction Station farm southwest of Ames, Iowa. The unusually late flowering and the atypically compound, corymbose form of the inflorescences suggested that his collection was not taken from a common North American *Rubus* L. A few weeks later, additional collections were made when the senior author accompanied Mr. Thompson to the site. By using the keys in Flora Europaea (Heslop-Harrison 1968) and Brambles of the British Isles (Edees & Newton 1988) and consulting European *Rubus* specimens held in ISC[3] and excellent illustrations in the Czech national flora, Květena České Republiky (Holub 1995), and the Illustrated Companion to Gleason and Cronquist's Manual (Holmgren 1998), the senior author determined the plants to be *Rubus caesius* L., the European dewberry.

In 1990, the junior author observed an unusual bramble in the Waterloo Recreation Area about 32 km WNW of Ann Arbor, Michigan. It displayed certain morphological characteristics that seemed intermediate between blackberries (*Rubus* subgenus *Rubus*) and raspberries (*Rubus* subgenus *Idaeobatus* Focke), such as pruinose, tip-rooting canes resembling *R. occidentalis* L., leafy, corymbose inflorescences, and very sparse fruit set, which might be related to hybrid sterility. During the course of studying the Michigan population, the authors concluded that, rather than being a novel intersubgeneric hybrid, these plants also fit key characteristics of *R. caesius*. *Rubus caesius* is not included in the Flora of Michigan (Voss 1985) and was explicitly excluded from Iowa's flora in a recent revision of *Rubus* for that state (Widrlechner 1998). Our recent discoveries, together with this taxon's absence from many pertinent floristic treatments, prompted this report.

---

[1] Journal Paper No. J-18,408 of the Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa. Project No. 1018 and supported by Hatch Act and State of Iowa funds.

[2] Deceased 8 January 2000.

[3] The abbreviations for herbarium names follow Holmgren et al. (1990).

HISTORICAL ACCOUNT

The introduction of *R. caesius* to the United States from the Old World has been described by Hansen (1937) and Bailey (1941). In 1897, the famous plant explorer, Niels E. Hansen, first formally introduced this species, as *"R. caesius turkestanicus,"* from Russia to the United States. Shortly thereafter, it received the number PI 281 from the USDA's Section of Seed and Plant Introduction (USDA 1898). In 1930, Hansen (1937) tested PI 24377, a later (1908) collection from Siberia, in South Dakota, where it was found to be sufficiently hardy but not very fruitful.

Liberty Hyde Bailey noted that the plant was of greatest value as a soil-stabilizer for covering steep embankments. By the time of Bailey's 1941 publication, *R. caesius* was known to be naturalized in the vicinity of Ithaca, New York and Big Rock at Cherokee Park, Louisville, Kentucky. *Rubus caesius* was also discussed in Fernald's (1950) treatment of *Rubus* in Gray's Manual of Botany, 8th ed., wherein he noted that the plant was locally spreading from cultivation.

We know of no local cultivated sources of *R. caesius* in Michigan, but the source of this plant in Iowa may be the same as that hypothesized by Widrlechner and Rabeler (1991) for *R. parvifolius* L. in Iowa. They noted that from the late 1930s until 1947, the USDA's Soil Conservation Service (SCS), now known as the Natural Resources Conservation Service, maintained a Hill Culture Research Station just southwest of Ames, Iowa, on a site now occupied by the farm of the North Central Regional Plant Introduction Station. Although there is no direct evidence that the Hill Culture Research Station was cultivating *R. caesius*, the 1946 Annual Reports of the Department of Agriculture (Bennett 1946) described research conducted by the Hillculture Research Division on the cultivation of cane fruits on eroded lands in Iowa. Considering Bailey's (1941) comment about the use of this bramble as a groundcover for erosion control, it seems quite plausible that the Hill Culture Research Station may have been the Iowa source population. The origin of our Michigan population remains unknown.

KNOWN COLLECTIONS IN IOWA AND MICHIGAN AND CURRENT STATUS

Iowa

On 20 September 1998, Jimmie D. Thompson noticed a bramble flowering and fruiting out of season on an abandoned pasture just southwest of Ames, Iowa. On 2 December 1998, Thompson and the senior author returned to this site and noted two large, tangled patches, the larger at least 10 meters in diameter, growing with *Aster pilosus*, *Juniperus virginiana*, and *Tridens flavus*. On this late date, although flowers and fruits were no longer present, the display of attractive red-orange leaf color was quite striking. Attractive autumnal coloration in this species was also noted by Bailey (1945). The following collections have been made:

STORY CO.: SW 1/4 NE 1/4 NW 1/4 Sec. 18, T83N R24W, Ames West Quad, elev. 309 meters, *Thompson s.n.*, 20 September 1998 (ISC and MICH), *Widrlechner & Thompson 439*, 2 December 1998 (ISC and MICH).

An earlier, published reference to the occurrence of *R. caesius* in Iowa (Guldner 1960) was erroneous, being based on misidentified collections of *R. roribaccus* (Bailey) Rydb. held at BDI, which represented atypical inflorescences from plants most likely damaged by ice. The absence of any known valid collections of *R. caesius,* as of September, 1998, led the senior author to exclude this taxon from Iowa's flora in his treatment of the *Rubus* of Iowa (Widrlechner 1998). It seems ironic that Thompson's initial collection, confirming this species' presence in Iowa, was made within days of the proofing of the galleys for that report. In addition, during the 1999 field season, Thompson located three additional populations to the east of the original collection in Sections 16 and 17. And although fruit production is generally poor, we suspect that new sites are slowly being colonized by bird- or mammal-mediated seed dispersal.

Michigan

The Michigan population was first noted by the junior author on 29 September 1990 during a field botany class. The fruits with their few large drupelets seemed very remarkable at the time (Figure 1). Later, summer collections were taken when the plants were observed in full flower. The population grows along the east side of an old road and is 45 m long and up to 4 m wide, with an extension running 35 m into a brushy, open woodland, with *Elaeagnus umbellata*, *Celtis tenuifolia, Populus deltoides*, *Quercus velutina*, and *Sassafras albidum*. The following collections from this population have been made:

WASHTENAW CO.: S Border Sec. 5, T12S R3E, NE side of junction of Ridge Road and Glazier Road in Sylvan Township. Waterloo Recreation Area, just N of Cavanaugh Lake, elev. 307 meters, *W.H. Wagner 90044, Wagner 93000, Robert and Ellen Masta 93007* (MICH).

Other nearby collections

Inquiries to numerous herbaria have produced only two other collections of *R. caesius* from Midwestern states. Through A. Cusick (Ohio Department of Natural Resources) and J. Furlow (OS), the senior author recently received two Ohio collections. The older is from Newberry Township, Miami County: *A.W. Cusick 22093*, 8 September 1982 (OS), and the more recent collection was made near Streetsboro, Portage County: *S.J. Mazzer s.n.,* 27 September 1999 (ISC). The next nearest known collection sites are from Allegheny County, Pennsylvania: *B.L. & J.A. Isaac 11722*, 15 October 1998 (CM, ISC) (which was still in flower on this late date) and from Jefferson County, Kentucky: *M. Slack s.n.*, 23 June 1939, and *M. Slack 3*, 27 May 1941 (BH).

FIGURE 1. European dewberry, *Rubus caesius*, from Washtenaw Co., Michigan (*W.H. Wagner 90044*). Note the peculiar fruits with few drupelets and evidence of insect damage.

DIAGNOSTIC FEATURES

Rubus caesius has tip-rooting, biennial canes armed with small prickles and bears flowers with broadly ovate, white petals and large, black drupelets that do not separate readily from their fleshy receptacles. Plants with such characteristics are commonly known as dewberries and belong to subgenus *Rubus*. *Rubus caesius* is the type species of the Old World section *Caesii* Lejeune & Courtois (Edees & Newton 1988), and is implicated in the parentage of a diverse array of apomictic Old World taxa placed in section *Corylifolii* Lindley (Weber 1981).

There are close phylogenetic affinities between Old and New World members of subgenus *Rubus* (Alice & Campbell 1999). Of the North American sections of subgenus *Rubus*, *R. caesius* most closely resembles section *Flagellares* Bailey, by reason of its perfect flowers (thus ruling out section *Ursini* Rydb., native to western North America), prickly armature, ovate primocane leaf shape, and low-arching, tip-rooting habit. Section *Flagellares* includes a diverse group of dewberries widespread in the Great Lakes states (Davis et al. 1968).

There are, however, at least four diagnostic features that can be used to distinguish *R. caesius* from members of section *Flagellares*.

1. The first-year canes (primocanes) of *R. caesius* are glaucous and tinged red where exposed to the sun. The coloration and bloom on the canes' surface resemble that of the canes of *R. occidentalis*. The canes of members of section *Flagellares* are not glaucous.

2. The stipules of *R. caesius* are ovate-lanceolate, whereas those of section *Flagellares* are linear-lanceolate to linear.

3. The inflorescences of *R. caesius* are corymbose, and its larger inflorescences are comprised of a short terminal corymb subtended by similar axillary corymbs, presenting a complex, paniculate form. Although some members of section *Flagellares* do bear corymbose inflorescences, such branched, complex corymbs do not regularly occur in any taxon in that section.

4. The mature fruits of *R. caesius*, when they form at all, are composed of 1-few (in Europe up to 20), relatively large (up to 6×4.5 mm if only one or two, but smaller with increasing numbers), drupelets that are black and glaucous (Heslop-Harrison 1968). The junior author examined the remains of 113 flowers from the Michigan population of *R. caesius*; only 27 of these produced fruits, with an average of 3.5 drupelets per aggregate. Typical fruits of section *Flagellares* have 12–50 smaller drupelets that lack a bloom.

There may also be phenological differences between *R. caesius* and North American dewberries. *Rubus caesius* tends to flower throughout much of the growing season (Edees & Newton 1988), making it much less determinate than our native dewberries. This phenomenon may be related to a reproductive strategy of producing small numbers of seeds, resulting from pseudogamy (Weber 1981), over a long period of time. Also, we observed plants of *R. caesius* growing much later into autumn than is typical for native dewberries. This is consistent with our observations that many other European trees and shrubs do not cease growth or develop leaf coloration until late in autumn when cultivated in the north central United States.

SUMMARY

Rubus caesius is a rarely noted member of the flora of the north central United States. It is native from Europe east to Siberia and was probably brought to our region because of its cold hardiness and ability to stabilize eroding sites. It may occur more widely in the region, but few records have been located. These first regional records can serve as a baseline to document the introduction

of this exotic shrub into our flora. Diagnostic, morphological and phenological characteristics for distinguishing *R. caesius* from similar, native dewberries are presented, in the hope that field botanists will now better recognize this species and be alert to its potential expansion.

The senior author would be particularly interested to learn of other occurrences of this species in the Midwestern flora.

ACKNOWLEDGMENTS

We sincerely thank Paul Catling, Donald Farrar, William Hess, Gail Nonnecke, and Kenneth Robertson for valuable critiques of this report and Deborah Lewis for all her help in contacting herbaria and processing loans. We are also grateful to Allison Cusick and the curators of A, BH, BHO, CAN, CINC, CLM, CM, DAO, F, GH, ILL, ILLS, JEPS, KE, KSC, MICH, MIL, MIN, MSC, MU, NA, ORE, OS, OSC, TEX, UC, WILLU, WIS, WTU, and YOU for their assistance. The senior author is pleased that this project provided an opportunity to work with, and learn from, Herb Wagner. He had great insights, was willing to share them generously, and will be dearly missed.

LITERATURE CITED

Alice, L.A., & C.S. Campbell. 1999. Phylogeny of Rubus (Rosaceae) based on nuclear ribosomal DNA internal transcribed spacer region sequences. Amer. J. Bot. 86: 81–97.

Bailey, L.H. 1941. Species batorum. The genus Rubus in North America I. Gentes Herbarum 5: 1–64.

———. 1945. Species batorum. The genus Rubus in North America IX. Naturalized European blackberries. Gentes Herbarum 5: 836–856.

Bennett, H.H. 1946. Report of the Chief of the Soil Conservation Service. Annual Reports of Department of Agriculture, 1946. U.S. Dept. of Agriculture, Washington, DC. 65 pp.

Davis, H.A., A.M. Fuller, & T. Davis. 1968. Contributions toward the revision of the Eubati of Eastern North America. Castanea 33: 206–241.

Edees, E.S., & A. Newton. 1988. Brambles of the British Isles. Ray Society, London. viii + 377 pp.

Fernald, M.L. 1950. Gray's Manual of Botany, 8th ed. American Book Co., New York. lxiv + 1632 pp.

Guldner, L.F. 1960. The vascular plants of Scott and Muscatine counties. Davenport Public Mus. Publ. Bot. 1: 1–228.

Hansen, N.E. 1937. Fruits, old and new and northern plant novelties. S. Dakota State Coll. of Agric. Exp. Sta. Bull. 309. 16 pp.

Heslop-Harrison, Y. 1968. Rubus L. IN: Flora Europaea. Volume 2. T.G. Tutin et al. (eds.). Cambridge Univ. Press, Cambridge. pp. 7–25.

Holmgren, N.H. 1998. Illustrated Companion to Gleason and Cronquist's Manual: Illustrations of the Vascular Plants of Northeastern North America and adjacent Canada. New York Bot. Gard., Bronx, NY. xvi + 937 pp.

Holmgren, P.K., N.H. Holmgren, & L.C. Barnett, eds. 1990. Index herbariorum, Part I, 8th ed. Regnum Veg. 120: x + 1–693.

Holub, J. 1995. Rubus L. - ostružiník (maliník, moruška, ostružinec, ostružiníček). IN: Květena České Republiky. B. Slavík (ed.). Academia, Prague. pp. 54–206.

USDA. 1898. Inventory No. 1. Foreign seeds and plants imported by the Section of Seed and Plant Introduction. Numbers 1–1000. U.S. Dept. of Agric., Washington, DC. 81 pp.

Voss, E.G. 1985. Michigan Flora. Part II. Dicots (Saururaceae—Cornaceae). Bull. Cranbrook Inst. of Sci. 59. and Univ. Michigan Herb. xix + 724 pp.

Weber, H.E. 1981. Revision der Sektion Corylifolii (Gattung Rubus, Rosaceae) in Skandinavien und im nördlichen Mitteleuropa. Paul Parey, Hamburg. 229 pp.

Widrlechner, M.P. 1998. The genus Rubus L. in Iowa. Castanea 63: 415–465.

——— & R.K. Rabeler. 1991. Rubus parvifolius (Rosaceae), naturalized in Illinois and Iowa. Mich. Bot. 30: 23–30.

NOTEWORTHY COLLECTION

WISCONSIN

GYPSOPHILA MURALIS L. (Caryophyllaceae). Cushion Baby's Breath.

Previous knowledge. In their preliminary report on the Caryophyllaceae in the Wisconsin flora, Schlising and Iltis (1961) described *Gypsophila muralis* as adventive in Marathon and Sheboygan Counties. Long-time readers of The Michigan Botanist will recall Rabeler's thorough paper (1981) that discussed the occurrence of this attractive little annual weed in Michigan, mapped its historical North American distribution, and compared the plant with two related species. At that time Rabeler indicated that *G. muralis* had not been collected in Michigan since 1900. He later reported on its collection in Gogebic Co., Michigan, in 1986 (Rabeler 1988). His exhaustive search of herbaria turned up collections made after 1960 from Massachusetts, Michigan, New Hampshire, Ohio, Vermont, Wisconsin, and Ontario (Rabeler 1981, 1988). Since 1960, *G. muralis* has been collected in Wisconsin from Eau Claire, Forest, Iron, Marathon, Marquette, Portage, Vilas, and Wood Counties. (Herbaria I consulted: MICH, MIN, OSH, UWEC, UWSP, WIS).

Significance: The significance of the Eau Claire collections is the surprising abundance of the plants, their widespread distribution across the City of Eau Claire, and their peculiar habitat. I first found about a half dozen plants scattered along a sidewalk on the campus of the University of Wisconsin-Eau Claire in 1997. Later that summer I noticed *G. muralis* growing abundantly at a neighborhood park. Interestingly, it was found mostly in an area that is flooded each winter for outdoor ice skating. Over the next two growing seasons I visited more than two dozen city parks and school playgrounds in Eau Claire. *Gypsophila muralis* occurred at each of the 16 parks with outdoor skating rinks. I also found it growing at four other parks that had rinks earlier in the 1990s, but have not been used for skating for at least one winter.

Outdoor rinks are created by leveling the ground with a bulldozer and using the excavated soil to build a foot-high berm around the circumference. In December of each year the oval is flooded from a nearby fire hydrant. During the summer these areas are covered with weedy growth and used for soccer and other warm-weather recreation. Plants of *G. muralis* were most abundant in the rink areas, but were often scattered nearby as well. At eight parks the plants were exceedingly abundant, with densities exceeding several hundred plants per square meter. In spots the diminutive plants are the dominant species, forming a pink haze over the ground during July and August. Common associates in decreasing order of estimated fidelity and abundance include *Potentilla argentea*, *Taraxacum officinale*, *Ambrosia artemisiifolia*, *Matricaria discoidea*, *Oxalis* sp., *Trifolium arvense*, *T. repens*, *Digitaria sanguinalis*, *Verbena bracteata*, and *Plantago major*.

I also searched six parks and school yards that do not have skating rinks, as well as several miles of city boulevards. *Gypsophila muralis* was found only

rarely, usually near the street where snow and ice are deposited by winter plowing. It was completely absent from baseball and soccer fields in parks that lacked rinks, but otherwise supported a weedy flora not too different from the skating areas.

EAU CLAIRE CO.: City of Eau Claire, University of Wisconsin-Eau Claire, along University Drive on upper campus. T27N, R9W, Sec. 30, 1 July 1997, *Rohrer 10353* (UWEC); City of Eau Claire, Lee Street Playground, along Lee St. opposite Fenwick Ave. T27N, R9W, Sec. 21, 9 July 1998, *Rohrer 10371* (UWEC, MICH, WIS); City of Eau Claire, Roosevelt Park, 908 Folsom St. T27N, R9W, Sec. 7, 5 July 1999, *Rohrer 10416* (UWEC, OSH, UWSP); City of Eau Claire, Pinehurst Neighborhood Park, 3523 Delbert Rd. T27N, R9W, Sec. 3, 10 July 1999, *Rohrer 10420* (UWEC, MIN).

LITERATURE CITED

Rabeler, R. K. 1981. Gypsophila muralis. Is it naturalized in Michigan? Michigan Botanist 20: 21–26.

———. 1988. Noteworthy collections. Michigan. Gypsophila muralis. Michigan Botanist 27: 91–92.

Schlising, R. A., & H. H. Iltis. 1961. Preliminary reports on the flora of Wisconsin. No. 46. Caryophyllaceae. Transactions of the Wisconsin Academy of Sciences, Arts and Letters 50: 89–139.

——JOSEPH R. ROHRER
Department of Biology
University of Wisconsin-Eau Claire
Eau Claire, WI 54702-4004

REVIEWS

THE SEDGES (*Carex* L.) OF RUSSIA AND ADJACENT STATES (within the limits of the former USSR). Egorova, Tatyana. St.-Petersburg State Chemical-Pharmaceutical Academy and Missouri Botanical Garden Press. 1999. Hardcover, 772 pp. ISBN 0-915279-67-3. US$49.95 from Brian Gardner, mbgpress@mobot.org; phone 314. 577. 9534; fax 314. 577. 9591. Credit authorizations taken via e-mail, phone, or fax.

At 6.5¢ per page, this is a great bargain. We botanists have Missouri Botanical Garden Press to thank for that. The decision was taken to co-publish this lifetime's work in order to make it more generally available in the West—another of the numerous efforts by the Garden to spur international botanical cooperation. Her work will be of greatest importance to European workers on the west and to workers in the flora of China to the east. American students of the genus will also welcome this book, because there a number of amphi-atlantic or circumboreal species of *Carex*. There are numerous lectotypifications which workers everywhere will have to consult.

The book was written and edited entirely in Russia. It is bilingual throughout, with the Russian first. I cannot read Russian, but it appears that nearly everything in Russian is likewise present in English. Figure captions, keys, descriptions, and the several chapters on more general aspects of the genus *Carex*—all are rendered fully (or nearly so) in English.

Yes, the English is sometimes rough. The editors at MO had no hand in this. Occasionally, the meaning is obscure (p. 372: "As follows from the synonymy, the systematic position of it widespread in Kamchatka and Kurils subspecies was assessed in extermely [sic] different ways, not to mention its misidentifications.") The example cited is an unusual occurrence; for the most part, at least native speakers of English will have no trouble. Given the extent to which English has become the international language of science, the author's decision to make her book bilingual is laudable. (There are places in the English translation of the vast Flora of the USSR, prepared by non-botanical professional translators, which are just as impenetrable.)

Egorova estimates that the genus worldwide includes 2,000 species. In the area covered here, she treats 346 species. The keys are dichotomous and appear to be entirely conventional. The illustrations are abundant and seem to be very well done. Not every species is illustrated. I would offer a rough estimate of 50%. I did not detect a credit line to the illustrator, but it was clearly someone of considerable skill and discernment. The drawings are *not* the over-inked, crude renderings of the original Flora of the USSR, 1935, in English translation 1964.

The illustrations that are present are often far distant from the treatment of the species themselves. They are referred to, but only by figure number, not by page number, and only in the Russian portion. With this book at one's elbow, I feel fairly confident you will put a name properly to a specimen, but it will be a chase.

The bibliography is extensive, with the works originally in Cyrillic cited first in alphabetical order, followed by an alphabetical listing of works originally in Roman alphabet. This must have been a vexing problem to the author, and I judge she has solved it very competently.

THE FLORA OF MANITOULIN ISLAND and the adjacent islands of Lake Huron, Georgian Bay, and the North Channel. J. K. Morton & Joan M. Venn. 3rd Edition. 376 pages, University of Waterloo Biology Series No. 40. Available from Department of Biology, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1. Spiral bound, $27.50; hard bound, $40.00, plus $7.50 postage and handling for Canadian orders, $10.00 postage and handling outside of Canada. Prices are in Canadian dollars. Specify hard bound or ring bound; the review copy is ring bound, and very easy to use. Personal checks are accepted; please send a check payable to "Department of Biology" for the full amount in U.S. dollars, if that is appropriate to your situation, and treat it as a contribution to good science from our friends in Canada.

The first 47 pages of the book are devoted to orienting the reader. The section on the geological history of the islands alone is worth the price of the book. The authors have read and absorbed a variety of technical works, and summed everything up in plain English for those who have had, maybe, an undergraduate course in Geology. It is a model of popularization, without sacrificing accuracy.

There are in general no keys. But in some complex groups, like *Salix* and *Amelanchier*, there are keys, which appear to be very useful. The flora is segmented into ferns, gymnosperms, and angiosperms. Within each of these categories, the arrangement of taxa at all ranks is alphabetical.

There is a segment on pp. 45-46 on new chromosome counts on plants from the Manitoulin region. This is an odd thing to insert into a flora, but maybe my mentioning it here will ensure the data are included in the standard chromosome indexes.

There are 16 pages of color photographs of 124 species, inserted between pp. 170 and 187; these plates are themselves unnumbered, but are counted in the total pagination. They are beautifully photographed and reproduced with great fidelity to the original colors. Finally, there are distribution maps for every species.

The index to scientific and common names occupies eight pages (colored pink) in the middle of the book.

This book deserves a wide readership. I spoke with a colleague, who has long had a summer home on Manitoulin Island, and she was excited there is now a third edition of the standard work. (Her expertise is in Animal Physiology; nonetheless, she wants to know the names of the things around her. Knowing their names is the first step toward caring about them.) I got the impression her copy of the second edition was getting ragged. Botanists of every stripe will thank the authors for a fine piece of scholarship.

This entire Biology series can be found on the web at science.uwaterloo.ca/biology/jcsemple/uwbioser.htm; it is a treasure of information across the field of Biology, at very fair prices, but if you go to the University of Waterloo website, you will never find it. Type in this URL and bookmark it.

——Neil A. Harriman
Biology Department
University of Wisconsin-Oshkosh
Oshkosh, WI 54901
harriman@uwosh.edu

THE BIG TREES OF MICHIGAN
23. Acer saccharum Marshall
Sugar Maple

Elwood B. Ehrle
Department of Biological Sciences
Western Michigan University
Kalamazoo, MI 49008

The largest known Sugar Maple in Michigan is located east of the village of Bear Lake in Manistee County in the Lower Peninsula.

Description of the Species: The Sugar Maple is a member of the Aceraceae; the family contains only two genera, *Acer* and the Chinese genus *Dipteronia*. There are seven kinds of maple native in Michigan. Maples are easily distinguished from other trees by their peculiar winged fruit, a double samara (Fig. 1). Each half of the fruit splits away from the central axis and spins away on the wind. The Sugar Maple is distinguished from other members of the genus by its palmately-lobed leaves, having long, narrow lobes with the sides of the terminal lobe diverging. The leaf sinuses are broad and blunt at the base, and the inner bark of the twigs is rank-smelling.

Location of Michigan's Big Tree: Our largest known Sugar Maple can be found near the village of Bear Lake, Manistee County, MI. To find the tree, take U.S. 31 to the north edge of the village of Bear Lake and turn east on 13-Mile Road. Go 3.3 miles to Big Four Road and turn right (south). Go 1.8 miles to the third white house on the east side of the road. The tree is about a thousand feet southeast of the farm house, and can be seen emerging from a Red Pine plantation. Walk into the pine plantation past 15 rows of pines (about 115′) and the tree can easily be seen. The locality is in section 18, T23N, R14W.

Description of Michigan's Big Tree: The tree has a solid trunk which divides into four major trunks 5′6″ (1.7 m) above the ground. The circumference of the tree at breast height was measured on 26 July 1995 at 225″ (572 cm). The crown spread was measured at 80′ (25 m). The height was measured at 78′ (24 m). The crown spread and height were slightly less than recorded some years by Paul Thompson, because the tree has lost several large branches.

INVITATION TO PARTICIPATE

If you would like to join us in extending this series of articles by visiting and describing one or more of Michigan's Big Trees, please contract the author for help with locations, specifications for taking measurements, and assistance with

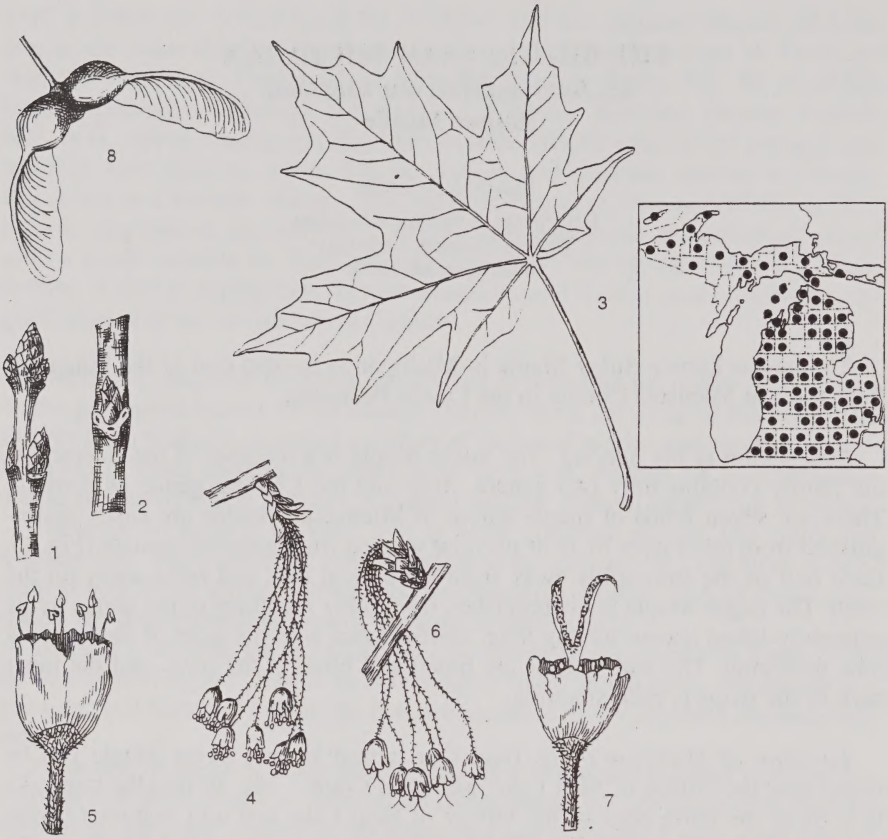

FIGURE 1. Documented distribution in Michigan and characteristics of the Sugar Maple. The map is from Voss (1985); the illustrations are from Barnes & Wagner (1991). 1. Winter twig, ×1; 2. Portion of twig, enlarged; 3. Leaf, ×½; 4. Male flowering twig, ×½; 5. Male flower, enlarged; 6. Female flowering twig, ×½; 7. Female flower, enlarged; 8. Fruit, a double samara, ×1.

the manuscript. The Michigan Botanical Club encourages your involvement in this activity. Please remember to ask permission before entering private property.

DEDICATION

This series of articles is dedicated to the memory of Paul Thompson, Michigan's Big Tree Coordinator for over 40 years, who died in 1994.

LITERATURE CITED

Barnes, B.V. & W. H. Wagner, Jr. 1991. Michigan Trees. A Guide to the Trees of Michigan and the Great Lakes Region. University of Michigan Press, Ann Arbor. viii + 383 pp.

Voss, E. G. 1985. Michigan Flora. Part II. Dicots (Saururaceae-Cornaceae). Bulletin of the Cranbrook Institute of Science No. 59 and University of Michigan Herbarium. xix + 724 pp.

CONTENTS

On the cover: *Dwarf Mistletoe, pistillate* Arceuthobium pusillum Peck *on Black Spruce,* Picea mariana *(Miller) BSP; less commonly, this parasitizes White Spruce,* Picea glauca *(Moench) Voss. (The author of the combination was a German botanist, Andreas Voss, 1857–1924.) Photo courtesy of Sandra L. Planisek, 9755 Bend Drive, Jenison, MI 49428.*